UNIVERSITY OF KWAZULU-NATAL

An examination of the use of pragmatic Learner-Centred Pedagogy (LCP) in the teaching of Mathematics in primary schools in Nhlangano-Swaziland

By

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DECLARATION

I Simon N. Dlamini declare that;

(i) The research reported in this dissertation, except where otherwise indicated, is my original work.

(ii) This dissertation has not been submitted for any degree or examination at any other university.

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ABSTRACT

The purpose of this study was to investigate the use of pragmatic learner-centred pedagogy in the teaching of Mathematics in primary schools in Nhlangano, Swaziland. The aims of the study were to examine the teachers' understanding of the use of pragmatic learner-centred pedagogy (LCP) and to investigate how this understanding influences their classroom practice in the teaching of Mathematics. The study used the qualitative methodology. It was carried out in schools in the Nhlangano area and three schools were used in April/May 2016. The participants of this study were teachers who were purposely selected from three schools. Data were collected through the use of a questionnaire, semi-structured interviews and an analysis of the teachers' official books. The questionnaire and the analysis of the teachers' official books was to examine the teachers' classroom practice in the teaching of Mathematics while the semi-structured interviews sought to find the teachers' understanding and experiences in the use of LCP. The data showed that although the teachers had a good understanding of LCP, they did not use it in their teaching. The study further revealed that the teachers faced a number of challenges against the implementation of LCP. These challenges include lack of pedagogical content knowledge on Mathematics, overcrowding in classrooms, lack of professional support, and the language barrier. The study therefore recommends that there is a need to address these challenges to enable the implementation of LCP. There is a need to conduct in-service training for the professional development of the teachers to improve their conceptual and theoretical understanding of LCP. There is also need to address the issue of class size and the language barrier for a complete implementation of LCP in the teaching of Mathematics.

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CHAPTER 1

INTRODUCTION AND ORIENTATION

1.1 BACKGROUND

There have been major developmental changes in education systems of most sub-Sahara African countries in recent years (Vavrus, Thomas & Bartlett, 2011, p. 9). Some of the countries where reforms in teaching method have been effected include Botswana, Kenya and Senegal. These reforms were aimed at shifting the teaching methods from teacher-centred methods to learner-centred methods. The learner-centred method of teaching is based on the constructivist theory of learning. The learner-centred pedagogy (LCP) approach develops high order thinking skills and problem solving skills in learners. In the case of Mathematics, this approach enables the learners to use the mathematical skills they learn at school in their everyday activities. This makes them realise the usefulness of the knowledge they get at school; hence, increasing the motivation to learn (Vavrus, et al., 2011). However, a case is made here that in Swaziland there is need to reform education so as to embrace the efficient use of leaner-centred pedagogy especially in the teaching of Mathematics.

The LCP approach demonstrates the idea of democracy in the classroom (Antal & Easter, 2009, quoted in Vavrus, et al., 2011). Through the exposure to LCP, learners experience democracy in action in the classroom since they are able to use their minds independently to problems. If schools use LCP, it results in a society of pragmatic and democratic oriented citizens who function autonomously. Hence the use of LCP is in line with the teaching principles of democratic education.

The use of the LCP approach also improves the economy of a country since learners through this approach become creative. They improve the economy through creative entrepreneurship (Vavrus et al., 2011). This is very important for Swaziland's developing economy. There is a great need for learners with entrepreneurship skills to develop the economy.

1.2 HISTORY OF EDUCATION IN SWAZILAND

After Swaziland gained independence in 1968, there have been some reforms in its curriculum. When the country obtained its independence from Britain in 1968, there was a need to review the curriculum. According to Magagula (1990) the intention to review the curriculum was stated in the Imbokodvo National Manifesto of 1972, which stated that "the purpose of education is to produce an enlightened and participant citizenry" (Magagula, 1990, p. 3). The curriculum inherited from the colonialists was designed to train learners for specific trades but did not develop creative thinking skills. Hence, the government put forward policies to help reform the curriculum.

A number of policies and plans have been developed to help improve the quality of education in Swaziland. One of these policies is the "Education for all", which aimed at making education available and free to all primary school going children. This goal was realised in 2005 when Swaziland adopted a national constitution that compelled government to provide free primary education (FPE) (Khumalo, 2013, p. 3). The Swaziland Education and Training Sector Policy was developed in 2011. The World Data on Education (UNESCO-IBE, 2010/11, p. 1) states that the Education Development Strategy's goals of education are to:

- "develop the intellectual, moral, aesthetic, emotional and practical capacities of children;

- equip citizens with the capacities needed to shape and adapt to a fast changing, complex, and uncertain socio-economic environment;
- engender a civic sense and to foster the skills necessary to participate effectively in a democratic society that reflects the socio-cultural context of Swaziland.
- create a population of lifelong learners with creative minds".

For all these goals to be achieved there is need to adopt a teaching strategy that promotes the engagement of learners. Such a strategy would use approaches that actively engage learners such as the learner-centred pedagogy. It is therefore on the basis of the above that my study seeks to explore how the learner-centred pedagogy can be fully implemented in the teaching of Mathematics in Swaziland.

1.3 CHALLENGES IN THE EDUCATION SYSTEM

After the introduction of FPE in Swaziland, the next concern became the quality of education being provided to the pupils. Khumalo (2013, p. 30) asserts that "the quality of education is cause for increasing concern". Quality of education according to the Ministry of Education and Training (MoET) includes teacher qualifications, teaching strategy, teaching and learning materials. (Khumalo, 2013).

The government of Swaziland has formulated a long-term strategic plan for education (2010-2022). This plan states that "the equipping of schools, learner-centred education, and decentralizing of school management will be addressed by 2013" (Khumalo, 2013, p. 53). In this case, learner-centred education is the teaching method expected to be used by the teachers in the schools in Swaziland. However, as for now the challenge is that the teachers are not fully using this approach in their teaching. Therefore my study becomes necessary in that it will seek to address the problem associated with the implementation of LCP in the teaching of Mathematics.

Another issue that has been of concern in the Swaziland education system is the high level of student drop-out from the primary schools. About 50% of pupils who enter the primary school do not complete the seven-year primary programme in Swaziland due to high drop-out rates (World Data on Education, 2010/11). Some take up to 10 years to complete their primary school because of repetition of Grades. There is, therefore, a need to examine the teachers' teaching strategies in order to minimise the drop-out rate and the number of learners repeating Grades. The high repetition and drop-out rate is caused by a number of reasons.

One of the reasons is the big number of orphans and needy children as a result of HIV and AIDS. A report by the Swaziland Ministry of Economic Planning and Development of 2007, orphans and needy children are at a higher risk of repeating Grades or dropping out of school. Other reasons for the drop-out rate, according to Ndaruhutse (2008) are generally the cost of schooling, the remoteness of the school, illness and malnutrition, the need to work, quality and relevance of schooling, etc. This study therefore is vital because it will bring insights regarding using methods that will motivate learners to stay at school and minimise repeating of grades and also recommend modalities to be used to curb the problem at hand.

On the relevance and quality of education some parents doubt the importance of education in their children's life. This is due to the fact that the education content is "bookish" in nature, and fails to empower the learners with skills and knowledge to make it possible for them to take part in their local economy (Ndaruhutse, 2008, p. 14). This leads to disgruntled and unproductive learners who are unable to contribute to their economy after finishing school, hence making their education irrelevant in society. Consequently learners drop out of school since they see schooling as a waste of time and money.

Ndaruhutse (2008, p.14) observes that "pedagogical methods in the school may not promote the critical thinking necessary for entrepreneurship, efficiency and effectiveness". This leads to parents not seeing the value for educating their children. Vavrus et al. (2011) note that one of the benefits of LCP is that it produces learners who are creative and can improve the economy of their country through creative entrepreneurship. Hence, learners who are taught through LCP are marketable in their local economy and this makes the society to realise the value of education. This decreases the drop-out rate from schools, especially in the rural areas. My study therefore seeks to examine how LCP can be fully implemented by the teachers in the schools.

There has been a shift in the teacher's role in the classroom since the enactment by the National Council of Teachers of Mathematics (NCTM) of the 'Curriculum and Evaluation Standards for School Mathematics' in 1989 (Bagley & Gallenberger, 1992) and due to the emergence of the theory of constructivism (Anthony, 1996). This shift is to a learner-centred approach away from the teacher-centred approach. Robinson (2012) says that the learner-centred approach is about considering the learners' needs, abilities, interests and learning styles. The learner-centred approach is important because according to Gosling (2003), in any class, each learner encounters a subject in a different way due to "their own unique past experience and their own understanding of themselves and their aspirations" (p.163). Further, each learner has his/her own identity influenced by his/her age, gender, nationality, goals, abilities, past educational experience, etc. The learner-centred approach caters for individual learner differences.

Rop Chepkemoi, Osman and Kirui (2013, p. 258) observe that "the use of learner-centred methodologies has become the focus of quality education and wholesome development of the learners" According to these authors, the main idea of learner-centred teaching is maximizing the

opportunities for learners to learn. To do this, one finds out the best possible ways to actively engage their minds to accommodate new information. Vavrus et al. (2011) assert that teachers have an important role to play in ensuring that learners develop learning capabilities necessary for the 21st century mathematician.

A number of studies indicate that using the learner-centred approach in teaching Mathematics develops high order thinking skills and problem-solving skills in learners, and promotes motivation to learn (Vavrus et al., 2011; Anderson & Krathwohl, 2001; Woolfolk, 2011; Winstead, 2004). The learner-centred approach also develops "cognitive flexibility", which is in line with Piaget's concept of learning through 'disequilibrium', resulting in meaningful acquisition of knowledge. According to McCombs (2001), the learner-centred approach also provides a positive learning environment in which the learner feels a part of the knowledge discovering process. Therefore, education systems should socialise learners to become responsible citizens and take part in the political society in which they live. It is within the above scope of logic that this study was carried out to determine how the Swaziland education system can fully incorporate LCP to produce democratically socialised citizens.

1.4 THEORETICAL FRAMEWORK

This study was driven by the theory of constructivism which states that knowledge is actively constructed by the learner, using his existing ideas. According to this theory, knowledge is not passively received from the teacher (Baker, McGaw & Peterson, 2007; Van de Walle, 2007). For learners to make appropriate constructions of knowledge, they should be actively involved in learning instead of being passive participants (Anthony, 1996). In the case of this research, active involvement means using learner-centred pedagogies.

The thesis used constructivism as its theoretical framework. Constructivism is in line with the Critical Pedagogy (CP). The CP approach is based on Freire's theory of education, called the critical pedagogy (Mtitu, 2014). Constructivism advocates teaching approaches that enable learners to construct knowledge rather than rote learning of concepts. Freire (1970) is against the teacher-centred approach to teaching. He calls the teacher-centred approach the 'banking model of education'. Freire says in the banking model, the teacher is considered as a possessor of knowledge, which has to be passed on to the learners. In this model, the learners are considered to be 'empty vessels' that have to be 'filled' with knowledge. He continues to say that this model of education inhibits creative thinking.

Freire (1970), therefore, suggests a learner-centred teaching (LCT) approach called "Problem-Posing Pedagogy" (p.79). Freire, asserts that the problem-posing pedagogy actively involves the learners in their learning, enabling them to use their prior knowledge in creating new understanding of concepts (Freire, 1970). This teaching approach is an opposite of teacher-centred pedagogies. In a teacher-centred pedagogy, the learner is a passive listener to the teacher. Freire alludes to the fact that passive learners become coward and feel inferior to their teachers, and the society in which they live. This is because teacher-centred methods do not inculcate creativity and critical thinking, which boosts one's confidence (Freire, 1970).

Freire, therefore, advocates for LCT, saying this approach results in 'education for freedom'. An LCT classroom is one in which the teacher promotes communication amongst learners, engages learners in problem solving activities and minimises learners' disruptive behaviours (Mtitu, 2014). The teacher and the learners have a good relationship in such a classroom. It is an activity-based classroom in which the teacher acts as a facilitator of the learning process. "Proponents of CP in education … desire a radical, hopeful, and action-based

pedagogy" (Mtitu, 2014, p. 40). The CP approach supports the constructivist approach to teaching/learning. It therefore supports the LCP approach, which is the basis for this research.

1.5 THE JAPANESE INTERNATIONAL COOPERATION AGENCY (JICA) TRAINING PROGRAMME

In trying to achieve its goal of using learner-centred pedagogy in the teaching of Mathematics, the Ministry of Education and Training collaborated with the Japanese International Cooperation Agency (JICA) to capacitate Mathematics and Science lecturers in the use of Problem-based Learning (PBL). This initiative resulted in the training of Mathematics and Science lecturers in the use of PBL. Six lecturers from Ngwane Teachers College attended this training, four of them in the Mathematics department and two were in the Science department.

The JICA programme, entitled "Primary Mathematics Teacher Educators Training for African Countries", aimed at increasing the capacity of teacher educators by strengthening their skills in promoting active teaching and learning in Science and Mathematics based on the philosophy of constructivism. The teacher educators were capacitated to produce teachers with adequate mathematical pedagogical content knowledge to enable them to facilitate in a learner-centred teaching approach. The lecturers were trained in stages, such that two lecturers went for a three weeks training each year. Upon their return, the lecturers implemented what they learnt from the JICA programme in their teaching at the college. This study therefore seeks to find out the impact of this training on the classroom practice of primary school teachers.

1.6 STATEMENT OF THE PROBLEM

The Swaziland Education and Training Sector Policy was developed by the Ministry of Education and Training (MoET) in Swaziland in 2011. In its foreword, it states that the main

objective of the MoET is to "provide access to relevant quality education at all levels of the education system to all learners in Swaziland" (Ntshangase, 2011, p. v). Through this policy, the government of Swaziland aims to join other sub-Saharan African countries that have reformed their curricula to learner-centred pedagogy. The MoET committed itself through this policy to making reforms that will improve the of quality education offered in the school system, at all levels. The quality of education is determined by factors such as, "teacher qualifications, teaching strategies, school infrastructure and schools facilities" (Ntshangase, 2011, p. 4).

In trying to improve the quality of education, the MoET is advocating learner-centred pedagogy (LCP), and this is clearly stated in the education policy document, under curriculum development. The policy states that one of the curriculum development policy objectives is to "provide a child-centred inclusive curriculum for the school system" (Ntshangase, 2011, p. 19). However, the main problem is that although the Swaziland government advocates for reforms in the teaching of Mathematics, teachers still do not totally use LCP. This is a great cause for concern in that learners are still taught through teacher-centred methods which encourage rote learning of concepts. Therefore, this study investigated the challenges teachers face in the use of LCP so as to understand why they do not use the LCP, and also proposed solutions to the problem.

In the case of Swaziland, no research was found that investigated teachers' understanding of LCP, their experiences in implementing it, and how these factors affect their classroom procedure in Mathematics teaching in the primary school. Therefore, the problem this research was trying to address was lack of uniformity between policy and practice since the policy states that teaching should be through LCP. The researcher observes student teachers during their teaching practice and has noted that most of them are failing to use LCP in their teaching.

The research was therefore trying to find out if the teachers in the schools understood the learner-centred pedagogy. The researcher also sought to investigate the extent to which teachers use LCP in their teaching of Mathematics in the primary schools.

1.7 PURPOSE OF THE STUDY

The purpose of this study was to find out the teachers' understanding of the use of pragmatic LCP approach, and how their understanding influences classroom practice, especially in the teaching of Mathematics.

1.8 SPECIFIC OBJECTIVES

The objectives of this study were as follows:

i. To assess the teachers' understanding of the learner-centred pedagogical approach in teaching Mathematics.
ii. To find out the teachers' experiences in the use of the learner-centred pedagogical approach.
iii. To determine the pedagogical approach(es) that is/are used by the teachers in their teaching of mathematics

1.9 RESEARCH QUESTIONS

- What are the teachers' conceptions of the pragmatic learner-centred pedagogical approach to the teaching of Mathematics?
- What are the teachers' experiences in the use of the learner-centred approach?
- What are the teachers' pedagogical approaches to their teaching of Mathematics?

1.10 SIGNIFICANCE OF THE STUDY

The study will yield useful information to the MoET on the success of the implementation and use of LCP in the primary schools.

The ministry of education will also get to know challenges faced by teachers in implementing the approach. The study will be useful to the National Curriculum Centre (N.C.C.) since it also speaks to issues to do with how best to design learners' materials that help teachers as they use the LCP approach in the teaching of Mathematics. This research will be useful to teacher training colleges since they could use the findings of the study to gauge how effective their LCP training is on student teachers.

The study will also provide useful information to the Japanese International Cooperation Agency (JICA) and its partners who are helping in the training of lecturers on problem-based learning (PBL). Furthermore, the study will reveal the impact of the lecturers' training on the use of LCP in Swaziland. This will help to strengthen the training of lecturers by JICA and its partners, on the use of PBL in the teaching of Mathematics and Science.

1.11 DEFINITION OF TERMS

Constructivism – A theory of knowledge that believes that learners generate knowledge and meaning from an interaction between their experiences and ideas. (Richardson, 2003)

Pragmatism – A practical approach to problems and affairs.

Pedagogy – "The instructional techniques and strategies that allow learning to take place" (Siraj-Blatchford, Sylva, Muttock, Gilden & Bell, 2002, p. 10).

Education – "The act or process of imparting or acquiring general knowledge, developing the powers of reasoning and judgement, and generally of preparing oneself or others" (Dictionary.com)

Democratic education – "An educational ideal in which democracy is both a goal and a method of instruction, bringing democratic values to education" (Yusef, 2014, p. 33).

Learner-centred pedagogy – "Methods of teaching that shift the focus of instruction from the

teacher to the learner, focusing on skills and practices that enable lifelong learning and independent problem solving" (Jones, 2007, p. 1).

Teacher-centred approach – A teaching approach that has "low levels of student choice, passive learners and power residing primarily with the teacher". (O'Neill & McMahon, 2005, p. 1)

1.12 CHAPTER SUMMARY

This chapter has introduced the study and its purpose, i.e., exploring the use of learner-centred pedagogy (LCP). The LCP approach of teaching emphasises the active involvement of learners in the teaching/learning process. This chapter has also described the historical development of education in Swaziland after independence. The chapter has described the government policies that have been enacted in a bid to improve the quality of education in Swaziland. The LCP approach has been introduced as one approach that can be used to improve the teaching of Mathematics in Swaziland. The chapter then discussed one intervention by the Swaziland government of training lecturers on the use of LCP in conjunction with JICA. This programme has resulted in capacitating Mathematics and Science lecturers on the use of LCP. The chapter has also presented the research questions and the problem statement that guided the study. Finally the significance of the study was presented.

1.13 CHAPTER DIVISION

This research consists of five chapters. **Chapter 1** is the Introduction of the study. The problem statement is formulated, the aim of the study, and research questions are all stated in this chapter. The LCP is introduced as an essential approach that could be used to improve the learning of Mathematics.

Chapter 2 consists of the Review of Relevant Literature to the research study. The review of literature was done on the concepts of constructivism and LCP. This review of literature was done to determine the importance of LCP in the teaching of Mathematics. The chapter also states the conceptual framework that guided the study.

Chapter 3 outlines the theoretical frameworks that informed the selection of the Research Design and Methodology used in this study. This is then followed by a description of the procedure used in conducting this research, i.e., the research design, sampling method and data collection procedure. The chapter describes the participants of the study and the instruments used for data collection. Finally, issues of ethical consideration and trustworthiness are discussed.

Chapter 4 presents the findings of the Study. This chapter describes how data were collected and analysed, using thematic analysis. A detailed description of how the transcribed interviews were analysed to come up with the themes that emerged is made. The research findings are finally presented and discussed in relation to the literature discussed in Chapter 2.

Chapter 5 provides a Summary of the findings, Conclusion and Recommendations regarding the implementation of LCP in Swaziland. The findings are discussed in relation to the research questions and the reviewed literature. Finally, recommendations for future research are put forward.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This study is an examination of the use of the learner-centred pedagogy (LCP) in the teaching of Mathematics in primary schools in Swaziland. The review of literature addresses various issues to do with the use of LCP in the teaching/learning of Mathematics. The literature review examines the use of LCP for conceptual understanding in the Mathematics classroom. The first part of the chapter describes the LCP approach. This is then followed by a presentation of the constructivist theory of learning, and its implications for classroom instruction. A relationship between constructivism and the LCP approach is established in this chapter. Advantages of using the LCP approach in the teaching of Mathematics are also discussed. The advantages discussed in this chapter include; the inculcation of democratic principles in the learners, active participation in the learning process, motivation for learning, promotion of critical thinking and the promotion of social learning. Another benefit of the use of LCP is the enhancing of self-regulated learning in learners leading to an improvement in the conceptual understanding of Mathematics. Finally, the chapter discusses the challenges faced by teachers in the implementation of the LCP approach. The chapter ends with a presentation of the conceptual framework that guided this study. The conceptual framework is based on the constructivist theory of learning which states that learners must be actively involved in the learning process to enable them to construct new knowledge.

2.2 LITERATURE REVIEW

2.2.1 The LCP approach

There are different ways and interpretations that people ascribe to the LCP approach of teaching. The most common definition is that which emphasises active participation of the learner in the teaching/learning process. According to this understanding, in LCP the teacher seeks to meet learners' needs and interests (Mtitu, 2014). This implies that in teaching, learners should be involved in learning activities that will meet their interests and be at their level of understanding. Robinson (2012) says learner-centred teaching is about taking into account the learners' needs, abilities, interests and learning styles. McCombs and Whistler (1997) define a school as a system providing service to students. Using a learner-centred approach means providing a conducive learning environment for all learners, taking into account their individuality/differences. This means that the content to be learnt should not be considered in isolation from the learners' needs and motivation. Hence, from this background, the LCP can be defined as:

> "the perspective that couples a focus on individual learners (their heredity, experiences, perspectives, backgrounds, talents, interests, capacities, and needs) with a focus on learning (the best available knowledge about learning and how it occurs and about teaching practices that are most effective in promoting the highest levels of motivation, learning, and achievement for all learners)" (McCombs and Whistler, 1997, p. 9).

This definition is based on the following premises of the learner-centred model found in McCombs and Whistler (1997):

1. Learners have differences. Their differences must be considered to enable all learners to get equal opportunities for learning.

2. Learning is best achieved if the learner can relate what is being learnt to everyday experiences. Learning is best facilitated if the learner is fully involved in constructing his/her knowledge by relating the information to be learnt with existing knowledge in the learner's mind.
3. Learning is best facilitated by a classroom environment in which the teacher has a welcoming attitude towards the learners and their ideas and in which the learners have positive relationships towards each other.
4. Learners have an intrinsic motivation to learn about the environment they live in. They need guidance from teachers to learn about it.

Teachers should have these premises in mind in all their teaching practices. Msonde (2011) also posits that different scholars have different interpretations of LCP. Some see it as using learner participatory methods of learning. Others see it as a shift of power from the teacher to learners. However, Msonde (2011) proposes that LCP should be considered in terms of how learners are engaged in relation to what they are to learn. The focus should be on "what students are expected to develop during the course of instruction" (p. 46). According to this view of LCP, the main objective in the teaching/learning process is how learners can be guided to master the instructional objectives given in the curriculum. From this perspective, Msonde (2009, in Msonde, 2011, pp. 46-47) defines LCP as "pedagogical activities that enable both the teacher and the learner to engage mutually in the object of learning in a manner that enhances student capabilities". An argument could be made on the basis of the above that all teaching/learning strategies are good as long as they enable the learner to learn meaningfully during the teaching/learning process.

The main idea of learner-centred pedagogy is maximizing the opportunities for students to learn. To do this, we find out the best possible ways to get them to do the work. For effective learning to take place, students should actively engage their minds to accommodate new information. The LCP approach is based on the constructivist theory of learning, which maintains that for learning to take place, learners should be fully involved in the learning process. Having described learner-centred pedagogy, the next section discusses the constructivist theory of learning.

2.2.2 The constructivist theory of learning

Constructivism is a key issue in education in recent years (Taber, 2011). Taber (2011) says that it is understood in various ways which include considering it as a learning theory, an ontological perspective about knowledge, and as an approach to social analysis. In this study, it shall be considered as a learning theory.

Anthony (1996) posits that educationists now perceive that learners actively construct knowledge. They do not passively receive it from the teacher. This is the constructivist view of learning. This view of learning is based on the belief that,

- "learning is a process of knowledge construction, not of knowledge recording or absorption
- learning is knowledge-dependent; people use current knowledge to construct new knowledge
- the learner is aware of the process of cognition and can control and regulate them; this self-awareness or metacognition significantly influences the course of learning" (Anthony, 1996, p. 349).

The constructivist view of learning believes that learners should be actively involved in the learning process. That is, they should actively participate in Mathematics lessons. Anthony (1996) asserts that this active learning is in two fold. The first interpretation is to consider active learning as related to the type of activity given to the learner. The second interpretation considers active learning as "a quality of the pupil's mental experiences in which there is active intellectual involvement in the learning experience characterised by increased insight" (Anthony, 1996, p. 350). This interpretation incorporates the notion of "mental effort or intentional learning, meaningful learning and metacognition" (p. 350). Hence, it is important that the teacher considers active learning in the sense that the learner is actively engaged in mental experiences that will result in deep rooted constructions of the concepts being learnt.

According to Biggs (1996), constructivism is a theory of learning that puts the learner at the forefront in the learning process. It rejects the belief of dualism between knowledge and the learner; rather claims that the learner creates his/her own knowledge during the learning process. According to this theory, new information is not transmitted to the learner by the teacher as it is, but learners construct their own knowledge "…by actively selecting, and cumulatively constructing, their own knowledge, through both individual and social activity" (Biggs, 1996, p. 348).

Mtitu (2014) also agrees with this viewpoint as he points out that the constructivist theory of learning believes that learners create their own knowledge during the teaching/learning process. He says this knowledge construction is a cognitive process that an individual is involved in as he/she tries to understand the world around him/her. This conception of learning, therefore, shifts the focus from teacher-centred instruction to LCP. The constructivist approach to learning requires that the teacher should "play a facilitative role promoting learners' active engagement in

the constructing of knowledge rather than transferring the subject content to the learners using teacher dominated instructional approaches" (Mtitu, 2014, p. 69).

On the other hand, educationists believe that classrooms should be made avenues for democratic practice through the use of learner-centred activities (Jotia, 2011). Such activities include group discussions, debates and reporting of group findings to peers without a fear of prejudice. The classroom environment should be conducive for the learner to "question the socio-economic and political realities surrounding him/her" (Jotia, 2011, p. 151). This is a class where learners can freely voice their ideas. Members of the class and the teacher accept other peoples' views and constructively critique each other. Such a classroom environment, which encourages constructivism, needs to be cultivated by the teacher through class activities that the learners are involved in (Mtitu, 2014). Hence, teachers should involve learners in activities that encourage group work, critical thinking, and problem solving. These activities should also allow free communication in the classroom without fear. This free communication should encourage learners to ask questions and seek clarity, from the teacher and from their peers, when there is something that they do not understand (Mtitu, 2014).

The constructivist theory is essential in driving this study in that it advocates an active participation of the learners in the learning process. This active participation of the learner develops problem solving skills and promotes democratic principles in the learners. The next session discusses one of the benefits of LCP, which is, enhancing democratic education.

2.2.3 The learner-centred approach: Nurturing democratic education

Education is a universal activity for most mammals, human beings included. The purpose of education is to prepare the young ones for the future ahead of them "so that they would acquire the necessary skills for sustenance and survival" (Volberg, 2008, p. 7). Volberg (2008)

observes that the type of education offered in any society determines the kind of future society that would be produced. Hence, to create a society that has democratic principles, there is a need for democratic education in the schools. Democratic education is defined by Gutmann, (2006, in Volberg, 2008) as the type of education whose end result are individuals that have knowledge and skills needed to participate in shaping their society together.

The school system should inculcate democratic principles in learners (Dewey, 1916 quoted in Vavrus et al., 2011; Jotia, 2010). A democratic society is described by Volberg (2008) as one in which its citizens are capable of political participation. Democratic education should empower learners with knowledge and skills to fully participate politically in their society. This, in turn, helps to preserve and renew the democratic society in which we are in. This democratic participation should not be taught 'abstractly' to the learners, but it should involve practical experiences in the school situation. Jotia (2011) contends that using the learner-centred approach to teaching promotes democratic education. He asserts that the use of the teacher-centred approach to education does not give opportunities for learner communication in the classroom, hence disabling democratic engagement.

Antal & Easter (2009, quoted in Vavrus et al., 2011) also make the same argument, that the use of LCP promotes democratic education in learners. They say that research has shown that using the learner-centred approach results in learners that have democratic principles and values. This is because the use of the learner-centred pedagogy promotes participation, democratic principles, critical thinking and problem solving (Jotia, 2011). This, in turn, develops learners that are creative, have a high degree of tolerance and can work collaboratively with others. These principles develop learners that "can become responsible and active citizens who respect and protect individual rights and liberties" (Jotia, 2011, p. 143). This is because the learner-centred

approach encourages learners to put forward their ideas without fear. Hence, they learn to publicly present their ideas and accept ideas from others since in the learner-centred pedagogy learners are encouraged to work collaboratively in groups.

Proponents of democratic education believe that education should produce learners who are critical thinkers and can actively participate in decision making in their society. Such learners can be produced through the use of LCP in the teaching of Mathematics in primary schools. This kind of education system would be of great benefit to Swaziland in order to promote democratic participation of the citizens.

Jotia (2010) says that "schools should be democratic spaces" (p. 118). This means the school system should inculcate democratic principles, i.e. schools should "nurture participation and democratic engagements by both teachers and students (p. 118). He asserts that a relevant and quality education is one that addresses "the principles of democracy in a more direct and robust way" (p. 114). For example, this issue of democracy in the Mathematics classroom can be inculcated through allowing learners to choose their own method of solving given problems and explaining how they got their solutions. Having discussed the importance of LCP, below is a discussion on some of the challenges that teachers face in using LCP in their teaching.

2.2.4 Challenges faced by teachers in the implementation of LCP

One of the challenges in the implementation of the LCP approach according to Vavrus, et al., (2011) is a lack of an experience of LCP by student teachers during their training. The authors say tutors in colleges of education only talk about LCP but do not practice it themselves. This results in the teachers also emulating the teacher-centred approach that they experienced during their training. The authors say studies in Sub-Saharan Africa have found that some tutors

lack pedagogical content knowledge (PCK). This is due to the fact that during their bachelor's degree training, they did general content knowledge without a focus on how to teach this content.

Another challenge is the assessment method used in national examinations. Jotia and Boikhutso (2016) agree that national assessment is an important component in the education system. It helps to make quality checks at different levels of the school system. In Swaziland, there are three national assessments; the first one is at the end of primary school, i.e., Grade 7. The next one is at the end of secondary school (Grade 10) and the final one at the end of high school (Grade 12). These national assessments are a necessary tool to foster school improvement and accountability to the nation. However, Jotia et al., (2016) say these national assessments should be aligned with the curriculum and instructional method used in the schools. Vavrus et al., (2011) say these examinations are usually based on the behaviourist assumption about knowledge. The manner in which the national examinations are set tend to encourage the teacher-centred mode of teaching where students are supposed to regurgitate knowledge as it is. Mtika and Gates (2010, quoted in Vavrus, et al., 2011, p. 82) say the national examinations put teachers under pressure to 'cover' the syllabus for an examination that will require a recall of factual knowledge. They say "under these pressures it will be difficult for teachers to justify spending class time having students engage in experiments to discover principles for themselves … when they will only need to be able to define the principle and restate conventional reasons to pass the examination" (Mtika & Gates, 2010, quoted in Vavrus, et al., 2011, p. 82).

In Swaziland, "it is noticeable that the curriculum in primary pre-service teacher training has more features in common with a generalist study program, with a strong emphasis on subject content or academic knowledge, than with a pedagogical diploma program" (Steiner-Khamsi & Simelane, 2010, p. 28). This observation alludes to the fact that the teachers that graduate in the

colleges and university do not have strong pedagogical content knowledge. They have subject content knowledge. This may be a hindrance in the implementation of LCP in the schools. The lecturers were not well trained on the use of the LCP approach. Only the Science and Mathematics lecturers went for training through the JICA initiative. Even the lecturers that went for training took only about three weeks of training. This time is not enough to master this approach very well.

In Swaziland, the government provides Mathematics pupils' books and workbooks for all primary school learners. However, to implement LCP in Mathematics, there is also a need for manipulatives in the classroom. These help the learners to make meaningful constructions of concepts. This is a challenge in Swaziland due to overcrowding in classes due to the introduction of FPE (Khumalo, 2013). This makes the provision of sufficient teaching manipulatives a challenge in the classrooms. One of the key drivers in learning is self-regulation. The next section discusses how LCP promotes self-regulation in learning.

2.2.5 Self-Regulated Learning (SRL) and the LCP approach

Self-regulated learning is a process that enables learners to focus their thinking patterns, beliefs, and feelings to success in their learning (Zumbrunn, Tadlock & Roberts, 2011). Olaussen and Braten (1999) say that self-regulated learners are determined in learning, using strategies that work for them to succeed in learning. They seek learning strategies that lead them to achieve their goals. They initiate and control their own learning experiences instead of reacting to the teacher's instruction. They set specific goals for their learning. As they learn, they continually assess their progress to see if the selected self-regulation process is effective. Boekaerts (1997, quoted in Olaussen, et al., 1999) notes that self-regulated learning involves both motivational and cognitive self-regulation. The motivational aspect of self-regulation encompasses motivational

strategies, motivational opinions and motivational strategies. The cognitive self-regulation components are cognitive strategies, content knowledge and cognitive regulatory strategies. Experienced self-regulatory learners combine these six components of this self-regulatory model. This shows a close link between the cognitive and motivational aspects of self-regulation. Effeney, Carroll and Bahr (2013) believe that social interaction among learners is important since it can lead to them sharing learning strategies that promote self-regulated learning. From the discussion in this section, the reader may recognise that LCP provides a conducive environment for learners to use self-regulation in their learning.

2.2.6 Pragmatic learner-centred pedagogy for learner empowerment

There are a number of advantages for using the learner-centred pedagogy in the teaching of Mathematics. Vavrus, et al., (2011) summarised these advantages into three main categories, these being cognitive & psychological, political, and economic reasons. These are important in the case of Swaziland as a country. This is because "Swaziland is going through a difficult time with a deteriorating economy, increasing unemployment through ever-increasing flows of school leavers and job seekers, increasing signs of social unrest and escalating crime, and the tragic impact of AIDS" (Stronkhorst, 2001, p. 8). There is therefore a great need to use teaching pedagogies that will address these problems that the country is facing. Each category of advantages is discussed in the following paragraphs:

Cognitive & Psychological

Cognitive reasons are to do with mental processes, e.g. construction of knowledge and problem solving. Psychological reasons include motivation, emotional stability and relationships with other people. Many studies indicate that using LCP in teaching develops high order thinking skills, problem-solving skills and promotes motivation in learning (Vavrus, et al., 2011;

Anderson & Krathwohl, 2001; Woolfolk, 2011). Learner-centred pedagogy also enables learners to use learned information in solving real life problems. Hence, the learner can use his/her knowledge in dealing with everyday situations. Learning through LCP develops "cognitive flexibility" which is in line with Piaget's concept of learning through 'disequilibrium', resulting in meaningful representation of knowledge (Vavrus, et al., 2011, p.46).

Political

According to Dewey (1916, quoted in Vavrus et al., 2011, p. 49), the process of education is meant to groom students "for active involvement in democratic forms of governance". LCP exposes learners to go through "democracy in action in the classroom and in the school as a whole to become democratic citizens" (p. 49). Research has shown that using LCP inculcates values and principles of democracy in students (Antal & Easter, 2009, quoted in Vavrus, et al., 2011)). This is because in LCP, students are encouraged to voice their opinions without fear; they question their peers' solutions and the teacher's presentation if there is something they are not clear about. This is against the teacher-centred methods where students tend to be passive and accept the authoritarian position of the teacher without questioning. To cultivate this "democratic political culture" in students, a number of African nations are moving towards LCP (Harber, 2002, p.273). This approach would be helpful in Swaziland since the cultural background of the learners does not encourage them to question adults (the teacher in the classroom situation). Being involved in an LCP class will enable the learners to be assertive individuals and make positive contributions in the society.

Economic reasons

Learner-centred pedagogy produces learners who are more suitable to industry due to their creativity. They can improve the economy of a country through creative entrepreneurship.

This is because LCP empowers students with skills of learning how to learn and flexibility which are so necessary in this dynamic economic environment. As stated by Stronkhorst (2001) the economy of Swaziland is going down. There is therefore a need for an education system that would produce creative students with problem solving skills. Such students will be in a position to create job opportunities in their communities, thus enhancing the economy of the country. It is a good thing to have citizens who are economically empowered and autonomous rather than relying on the government for almost everything. Education should lead to some independent production and self-sustenance.

2.3 CONCEPTUAL FRAMEWORK

Rop Chepkemoi, Osman and Kiriu (2013) say that "Quality education is one that leads to effective learning amongst the learners" (p. 255). These writers define effective learning as one that results in attainment of appropriate learning skills according to the curriculum, development of creative thinking and ability to apply knowledge in solving problems and a "commitment to life-long learning" (p. 255). Out of the many factors that are required for quality education to take place, the teacher is the most important factor. Rop Chepkemoi, et al. (2013) report that a number of studies in Australia have concluded that the major determinant of students' achievement in learning is the quality of teaching that takes place in the classroom.

The teaching approach used by teachers determines the acquisition by learners of habits of mind that are necessary for the 21st century mathematician. Although there are other factors that are necessary for quality education to take place, if teachers lack pedagogical knowledge, the other factors may not result in quality education taking place. Hence, "the use of learner-centred methodologies has become the focus of quality education and wholesome development of the learners" (Rop Chepkemoi, et al., 2013, p. 258). Vavrus, et al., (2011) say that "today

policymakers are ever more concerned with finding ways to improve how teachers teach and not merely increasing the number of teachers" (p.22). That is why Swaziland has developed policies to ensure that teachers use pedagogical approaches that are learner-centred, therefore promoting problem solving skills and discouraging methods that lead to learning by rote. Therefore, this study is underpinned by the theory of constructivism which places the learner at the heart of the learning processes. Psychological constructivism posits that learning begins with what students bring to the learning environment, such as prior knowledge, attitudes, interests, etc.

2.3.1 Constructivism

According to the theory of constructivism, the learner learns by constructing his knowledge while interacting with the environment or with a knowledgeable other and that knowledge is mediated by tools. Richardson (2003, p. 1623), contends that constructivism is a theory of learning that believes that learners create their own understanding of a new phenomenon using their pre-existing knowledge. Hence, according to constructivism, the learner does not come to the classroom as 'an empty vessel' that needs to be filled with knowledge but brings a lot of prior knowledge and experiences to the classroom.

Constructivism rejects the belief of dualism between knowledge and the learner, rather claims that the learner creates his own meaning during the teaching/learning process. Proponents of this theory believe that knowledge is not transmitted to learners by the teacher as it is; rather learners construct their own knowledge (Biggs, 1996). Gagnon and Collay (2006) say constructivism brings a paradigm shift in education. The paradigm shift proposes teaching according to the cognitive theory instead of according to behaviourism. The constructivist theory of learning believes that learners construct knowledge based on experiencing things and reflecting on those experiences.

To construct is to fit ideas together to create an understanding of a complex idea. Gagnon, et al. (2006) postulate that constructivist learning is based on the following ideas;

"1. Knowledge is physically constructed by learners who are involved in active learning.

2. Knowledge is symbolically constructed by learners who are making their own representations of action;

3. Knowledge is socially constructed by learners who convey their meaning making to others;

4. Knowledge is theoretically constructed by learners who try to explain things they don't completely understand" (p.1).

Gagnon, et al. (2006), hence, propose a "Constructivist Learning Design" on the basis of the above discussion. In this constructivist learning design, Gagnon, et al. (2006) say in designing learning experiences for primary school learners, the teacher should focus on what the learners will do rather than the teacher activities. The authors propose six elements of a lesson planning template based on the constructivist theory of learning. The six elements are; Situation, Groupings, Bridge, Questions, Exhibit, and Reflections.

a. *Situation*: The situation involves creating a context in which the learning experience will be based. The context will lead learners into a problem solving scenario. Through solving the problem, the learners will learn new concepts, skills or attitudes.
b. *Groupings*: The teacher should think about how he/she will group the learners for collaborative learning.
c. *Bridge*: This could be a brainstorming activity to check the learners' prior knowledge so as to build a "bridge" from what the learners know to what they are to learn.

d. *Questions*: The type of questions that the teacher will use during the teaching/learning process should also be considered. Questions to be used are those that promote active learning and critical thinking.

e. *Exhibit*: The learners should be able to explain to the other learners and to the teacher how they have solved a problem or how they have executed a given activity.

f. *Reflections*: This involves learners' thoughts and conclusions at the end of the learning activity. It is a reflection of what was learnt in the lesson.

Gagnon, et al.'s (2006) constructivist learning design proposes a lesson planning template for a constructivist (learner-centred) lesson.

2.3.2 Acquisition of new knowledge

When teaching a new concept, primary school learners will construct the intended knowledge meaningfully if they possess appropriate prior knowledge for learning the concept (Mtitu, 2014; Taber, 2011). It is important, therefore, that the primary school teacher checks the learners' existing knowledge so as to use that knowledge to introduce new information. According to Taber (2011), teaching without a consideration of the learners' existing knowledge can result in "misinterpretations, failures to make expected links, or making inappropriate links" (p. 49). Expressing their existing knowledge about a topic also boosts the learners' confidence in learning. The teacher can facilitate acquisition of new concepts by building a "bridge" or connect a new concept with their existing knowledge. This would then aid understanding of the concept (Van de Walle, 2007). Understanding is defined by Van de Walle (2007) as a measure of the number and quality of connections that a concept has with other concepts in the already existing knowledge. This definition is in line with Shield and Galbraith's (1998) assertion that, in Mathematics learning, understanding is accepted to involve linking the information being learnt

with prior knowledge. Skemp, (1978, quoted in Shield and Galbraith, 1998) describes this kind of learning as 'relational understanding' as opposed to 'instrumental' or rote learning.

Therefore, if a concept is well understood by a learner it will have many and strong connections with the already existing concepts. On the contrary, a concept that is not well understood will not have any connections with the already existing concepts. Hence, the degree of understanding of any concept by primary school learners is determined by the number of connections it has with already existing concepts. Through enabling a learner to activate existing knowledge for a topic, the teacher facilitates a connection of the new knowledge to related concepts in the learner's cognitive structure. Hence, the importance of the "bridge" in Gagnon's, et al.(2006) constructivist learning design.

Swing and Peterson, (1988, quoted in Shield & Galbraith, 1998) used the term 'elaboration' to describe this process of linking new knowledge with existing knowledge. It has been found in many studies that elaborate processing enables learners to "apply the new knowledge in novel problem situations" (Shield & Galbraith, 1998, p. 35). Therefore, when we teach for understanding, we want the learner to connect the new information with as much of his/her already existing knowledge as possible. This result in the learner working out problems with flexibility rather than only following rules and procedures that he/she may not even fully understand. Another important attribute enhanced by the LCP is learner's self-regulation.

2.3.3 Self-Regulation

The phenomenological view of self-regulation links the ability of a primary school learner to learn to his/her perception about himself/herself (Zimmerman, 1989; Zumbrunn, et al, 2011; Effeney, et al, 2013). According to this view the learner's self-concept influences his/her academic achievement in education. Phenomenologists believe that to motivate a primary school

learner to self-regulate in his/her learning, one has to boost the learner's self-confidence. A learner who believes in himself/herself shows confidence and intrinsic motivation in his/her learning. The social cognitive view of self-regulation is based on Bandura's social learning theory (Zimmerman, 1989; Effeney, et al, 2013).

According to Zimmerman (1989), Bandura's social learning theory assumes that learning is influenced by environmental, behavioural and personal factors. Boekaerts (1997, quoted in Olaussen, et al., 1999) notes that self-regulated learning involves both motivational and cognitive self-regulation. The motivational aspect of self-regulation incorporates motivational strategies, motivational views and motivational strategies. Cognitive self-regulation components are cognitive strategies, content knowledge and cognitive regulatory strategies. Experienced self-regulatory learners combine these six components of this self-regulatory model. There is a close link between the cognitive and motivational aspects of self-regulation.

There are six main self-regulation learning theories (Zimmerman, 1989). These are; the Operant view, the Phenomenological view, the Social cognitive view, the Volitional view, the Vygotskian view, and the Cognitive constructivist view. Each one of these self-regulation theories sheds some light on learning and student motivation. This makes them very useful to teachers. This is because the theories enable teachers to know how their students learn and get ideas on how to motivate them to learn better.

Self-regulated learning theories believe that the learner is actively involved in his/her learning. This is the reason some learners successfully learn despite obvious limitations in their mental ability, for example, a disadvantaged social environmental background or low standards of the quality of education. It also explains why a learner may not achieve academically even

though he/she has a high level of mental ability, comes from a good social environmental background and is exposed to high standard quality education.

The Vygotskiaan view of self-regulation emphasises on the importance of language in learning. This view is based on Vygotsky's theory of learning. The main features on Vygotsky's theory are inner speech, which provides knowledge, and conversation between adults and children, which teaches children speech. According to Vygotsky, speech helps learners in planning solutions to problems (Zimmerman, 1989a). This view believes that learners self-regulate when there is communication in the classroom at all levels, including learner-learner and learner-teacher communication. In the case of learner-centred pedagogy, the teacher allows constructive discussion among the learners (Effeney, et al., 2013). One can therefore conclude that the use of LCP promotes self-regulation in learners. In the next section a discussion of the benefits of the use of LCP in teaching and learning is presented.

2.3.4 How LCP improves learning

There are a number of factors that are very important in the learning process. They are factors that favour or facilitate meaningful learning. Some of these factors are motivation, reflective thought, social interaction and the use of teaching models (Van de Walle, 2007).

a. Motivation: Motivation is regarded as

> "….the key component of any instructional method is the means by which students can be motivated to learn Mathematics. In the absence of such motivation, learning is reduced to a sequence of activities imposed by an agent external to the student, thereby leaving the student with a clear option of rejecting either the agent or the activities" (Cooney & Hirsh, 1990, p. 107).

A motivated learner is easy to teach and learns better than one who is not motivated. Cooney, et al., (1990) urge that a teacher should arouse both extrinsic and intrinsic motivation to promote learning. According to Cooney, et al. (1990), extrinsic motivation is derived from external benefits for learning such as grades or prizes. Intrinsic motivation, on the other hand, is derived from internal factors such as a desire to learn and an interest in the subject. Cooney, et al. (1990) say cognitive theorists believe that intrinsic motivation is more important in learning than extrinsic motivation. He asserts that a motivated learner exerts effort to attain goals that he/she has set for himself/herself. That is, he/she is self-regulated in his/her learning. He also states that a motivated learner thrives to understand what he/she is learning in spite of challenges that he/she may face. This is in contrast to learners with performance goals who only think about getting the right answer and hence may choose easy tasks, e.g. memorizing and rote learning "to demonstrate achievement" (Cooney, et al. 1990, p. 102).

Winstead (2004) says learners can be intrinsically motivated by the teaching method used by the teacher. He says methods of teaching that motivate learners are those that are learner-centred. Learner-centred methods are more important in the teaching of Mathematics to Primary school learners since these learners are still in the Piagetian 'Concrete Operational stage' (Mwamwenda, 1989). According to Piaget, these learners "should be given the opportunity of experimentally and actively manipulating objects" (Mwamwenda, 1989, p.71). Learner-centred methods provide learners with "opportunities for problem solving, critical thinking…." (Winstead, 2004, p. 46). Winstead (2004) says such methods make learners to feel successful in their learning. He adds that learners are also motivated to learn when the teaching activities promote social interaction, when the material that is learnt is related to their everyday life and when it makes use of their already existing knowledge.

Social interaction between learners has also been found to be intrinsically motivating (Winstead, 2004). He elaborates that it is motivating since discussing in groups helps learners to express their views without fear, which he says it helps to boost their confidence and have a will to learn.

b. Reflective thought: Van de Wall (2007) suggests that one way to engage learners in reflective thinking is to use the problem-centred approach to teaching Mathematics.

According to Van de Wall (2007), reflective thinking can also be promoted by requiring learners to write about their solutions to problems and also through discussions with peers. Van de Wall (2007, p. 5) emphasises that both writing and discussions should be "built into" most of a teacher's lessons. Learner-centred pedagogy promotes reflective thought since it encourages group discussion. The recognition of prior learning also encourages reflective thought resulting in meaningful understanding of concepts.

c. Socio-constructivist learning: An interaction of learners with each other and with the teacher in the classroom leads to reflective thinking (Albert, 2000). Albert (2000) refers to reflective thinking as a process in which there is a mental engagement of learners in the learning process. Reflective thought activates all related ideas to the concept to be learnt. This results in an interconnection between the new idea and all related ideas in the already existing knowledge. Hence, meaningful learning takes place (Van de Walle, 2007).

During such an interaction, the learners share ideas, compare results, explain one's approach in solving a problem, explain one's understanding of an idea, challenge each other's ideas, etc. Such an interaction engages the learners in high level thinking, which results in meaningful learning taking place. This view is supported by Vygotsky's theory of social learning. According to Vygotsky, social interaction is very important for meaningful learning to

take place. Palincsar (1998) says that postmodern constructivist views believe that learning is a social phenomenon which is facilitated by cultural activities and language. According to Palincsar (1998), researchers believe that when learners work together, e.g., in group work, knowledge is structured in multiple ways in the learners' cognitive structure than when the learner works alone.

This multiple representation of knowledge enables a learner to apply his/her knowledge in novel situations. Social interaction also enhances the promotion of high order thinking skills. The attainment of higher order thinking skills is explained by Piaget's 'socio-cognitive conflict'. Socio-cognitive conflict is cognitive conflict that is created by social interaction. Piaget postulated that a contradiction between the learner's present knowledge and a new experience leads to a disequilibrium in the learner's cognitive structure, which makes the learner to construct new knowledge. According to Palincsar (1998), Piaget believed that social interaction among children is more likely to result in cognitive development than social interaction among a child and an adult. This belief was based on the premise that "among age peers there is mutual control over the interaction" (Palincsar, 1998, p. 350).

Vygotsky (1978, quoted in Albert, 2000) supports this view by introducing two zones of student construction of knowledge. He calls them the ZPD (zone of proximal development) and the ZPP (zone of proximal practice) (Albert, 2000; Taber, 2011). Within the ZPD learners acquire knowledge when they are involved in social interaction with peers or with the teacher. He and other investigators call this level the inter-psychological plane, or the social level. These collaborative social interactions of the learner lead to operation on a higher level, called the intra-psychological plane. This is called the second plane. He maintains that movement of the

learners' operation capability from one zone to the next is facilitated by social interaction. The highest level of cognitive thinking is the ZPP.

In this zone, a learner is capable of independent thinking and self-assisted problem solving. Albert (2000) likens this movement from one zone to the next as scaffolding that result in the student reaching the ZPP. Therefore, without social interaction it is not possible for a learner to go past the ZPD.

d. LCP and the use of teaching materials: The use of LCP in the teaching of Mathematics needs teachers to plan learning experiences which motivate learners to learn (Mtitu, 2014). These are experiences that are full of learners' activities. An activity-based teaching activity needs a provision of manipulatives that the learners will use in their 'discovery' of knowledge. The use of teaching materials/models is a fundamental requirement in the teaching of Mathematics (Barman & Allard, 1993). It provides a hands-on approach in the teaching of Mathematics (Barman, et al., 1993, p. 5). Shaw (2002) says the National Council of Teachers of Mathematics (NCTM) "emphasises the importance of using manipulatives and visual representations" in the teaching of Mathematics at all levels (Shaw, 2002, p. 1). She alludes to the fact that manipulatives assist learners in constructing mathematical concepts by representing the concepts in multiple ways.

The use of manipulatives deepens the understanding of concepts, hence minimising the need to memorise Mathematics 'rules'. The development of Mathematics concepts with the learners through the use of manipulatives makes the learners to 'own' the concepts they have learnt. This ownership of knowledge results in the development of intrinsic motivation for the subject. The teacher should, therefore, provide teaching materials in the class to stimulate the learners' thinking and help them 'discover' concepts on their own. Taber (2011) believes that it

is important to use teaching materials when teaching abstract concepts to enable learners to make connections with knowledge that could be familiar, e.g. models. This will ensure that learning is 'hands-on' with the teacher providing the necessary support for knowledge construction to take place.

2.4 CHAPTER SUMMARY

This chapter has presented the LCP approach as an approach that is suitable for the teaching of Mathematics. The literature review has shown that the LCP approach is based on the constructivist theory of learning. This theory of learning emphasises the need of an active involvement of learners in learning new information. This active involvement results in the promotion of creativity, high order thinking and problem-solving skills. For an active involvement of the learners in the lessons, the teacher should develop activity based classroom instructions with appropriate manipulatives.

The chapter has also presented the impact of teaching through LCP for democratic education. A brief review of the challenges in the implementation of LCP has also been presented. The next chapter will present the methodology and research design for the study.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

The preceding chapter outlined a literature review on the use of the learner-centred approach to teaching Mathematics. This chapter explains the procedures undertaken in doing the research project and justifies the methodology used to collect data from the research sites. The chapter begins with a description and justification of the research design. The qualitative approach is described and the reasons for choosing it for this research. The researcher then explains the process of sampling and reasons for the sampling procedure to be used. A discussion of ethical considerations comes next. The researcher then briefly describes each method of data collection, i.e. the semi-structured interview, questionnaire and an analysis of the teachers' professional books. The methodology of data analysis is discussed next. The limitations of the study are outlined. The researcher then discusses measures undertaken to ensure reliability and validity of the data. The chapter concludes with a summary of the methodology used in carrying out the research.

3.2 RESEARCH APPROACH

According to Cresswell (2009), a research design is a plan and the processes that guide the research on techniques of data collection and analysis. Cresswell (2009) says that there are three main types of research designs. They are qualitative, quantitative and the mixed methods design. (Cresswell, 2009) observes that the research problem is one of the determinants of the research design used in a study. The research problem for this study was to determine the

teachers' understanding of LCP, their experiences in the use of LCP and how these factors influenced their classroom practice. According to Cresswell (2009), the qualitative research design is useful when the researcher would like to know how a population understands a phenomenon. Hence, this study embraced the qualitative research method. Patton (1990) says the qualitative research method enables a researcher to investigate an issue in detail and in-depth than the quantitative method. Merriam (1998) also asserts that it is through the qualitative method that a researcher gains an understanding of how people conceptualise their experiences in a different way from any other method of research. Hence, this method comes handy for this study in that it allowed the researcher to assess the teachers' understanding of the learner-centred approach and finding the teachers' experiences in its use in teaching.

This is supported by Brikci and Green (2007) as they write:

> "Qualitative methods generally aim to understand the experiences and attitudes…These methods aim to answer questions about the 'what', 'how' or 'why' of a phenomenon… if the aim is to understand how a community within it perceives a particular issue, then qualitative methods are often appropriate" (pp. 3 - 4).

The qualitative method enables one to have an understanding of new views on an issue that has already been researched on and to get deeper information that may be difficult to gain quantitatively (Patton, 1990). Cresswell (2009) also asserts that qualitative researchers seek to find the opinions and viewpoints of the individuals who are part of the phenomenon being investigated. Hence, the researcher decided on the qualitative methodology in order to get the teachers' experiences and perspectives on the use of the learner-centred pedagogy in teaching Mathematics. Qualitative research brings out an understanding of how people view the world and how they experience certain phenomena.

The qualitative research method is suitable for examining sensitive issues through a development of trust between the researcher and the participants (Griffin & Phoenix 1994). The qualitative design also permits for the collection of data through different methods, e.g. interview, observation, document analysis, etc., instead of relying on only one data collection method (Cresswell, 2009). It is for these reasons that the researcher decided to use the qualitative method in this study, in order to get an insight of the teachers' conceptual understanding of the learner-centred pedagogy.

3.3 STUDY SAMPLE

The researcher used purposive sampling to select the schools that were involved in the research. Cohen, Manion and Morrison (2007) explain purposive sampling as choosing participants or cases for a specific purpose. It involves choosing participants who fit a specific profile. In this study, the researcher used a "maximum variation sample" (Brikci, et al., 2007, p. 9), which basically entails involving schools from urban schools and from rural schools.

The study took place in schools around Nhlangano. Nhlangano is a town found in the Southern part of Swaziland. The main economic activity of the town is agriculture and forestry. There is a teacher training college just about 5 kilometers from the town centre. The teacher training college uses the schools around Nhlangano as centres for teaching practice for college students. The teachers and administrators from these schools act as cooperating teachers, who help student-teachers during teaching practice.

The college organises workshops to sensitise the cooperating teachers on current trends in teaching pedagogies. Hence, the researcher believed that the teachers from the schools around Nhlangano would provide necessary and appropriate information on the use of the learner-centred pedagogy in the teaching of Mathematics in the schools. Three schools (n = 3) were

chosen to be involved in the research. To ensure variation in the sample, one (n = 1) of these schools was in the urban area, one (n = 1) was in a rural area and one (n = 1) was located in a semi-urban area. This was done to ensure that the results of the research are not biased against either the rural or urban area schools.

3.4 DESCRIPTION OF RESEARCH SITES AND PARTICIPANTS

The participants in this research had to fit the following profile; they should have been hired on a permanent basis by the Teaching Service Commission of Swaziland, hold at least a diploma in teaching, with Mathematics as one of their majors at college or university, and must have taught Mathematics in the primary school for at least three years. I believed that these teachers' experience in teaching would enable them to provide pertinent information about the profession which would certainly benefit the study. Two Mathematics teachers from each school were involved in the research. Overall, there were six participants. These were the teachers that had taught Mathematics in Grade 6 or Grade 7 for at least three years.

3.4.1 Research site one

Research site one was a government primary school located next to the town central business district (CBD) area. It is within a walking distance from the town centre. The school is used by a local teachers' college to conduct teaching practice for its students. The school produces one of the best results in Grade 7 in the region, according to the Examinations Council of Swaziland. The school has an enrolment of about 750 learners from Grade 1 to Grade 7. Each Grade has a double stream, with at least 50 learners in each stream, except for Grade 2 which had 3 streams. There were no boarding facilities at the school; hence, all the learners were day scholars. The school uses team teaching, where each teacher in the higher Grades teaches the

subject that he/she majored in at college. Hence, Mathematics in Grade 5 to Grade 7 was taught by teachers who took Mathematics as one of their major subjects at college. Two teachers were involved in the research in this school. They will be called Sabelo and Senzo (not their real names) in this report.

Teacher one – Senzo

Senzo was a male teacher who was in the 31-40 years age bracket. He had a teaching experience of 3 years, teaching Mathematics in the primary school. He had a Primary Teachers Diploma (PTD) with specialization in Mathematics and Science.

Teacher two – Sabelo

Sabelo was a male teacher who had an experience of 14 years of teaching Mathematics in the primary school. He was in the 31 – 40 years bracket of age. His qualification was a Primary Teachers Diploma (PTD) with majors in Science and Mathematics.

3.4.2 Research site two

Research site two was a mission school of the Methodist church. It is located on the outskirts of Nhlangano. It is therefore in a suburban area. Some of the learners who attend in this school come from the urban area but most of them come from the rural areas that surround the school. It has an enrolment of about 600 learners from Grade 1 to Grade 7. All learners were day scholars.

Mathematics in the school was taught by teachers who did at least the Primary Teachers Diploma and majored in Mathematics and Science. Two teachers, teaching Mathematics in Grade 6 and Grade 7, in the school were involved in the research. One was female and the other a male teacher. These teachers will be called Sophie and James, not their real names, to protect their identity.

Teacher three – Sophie

Sophie was a female teacher who had an experience of 9 years teaching Mathematics in the primary school. She had a Primary Teachers Diploma (PTD) in which she specialised in Science and Mathematics. She was also doing a Bachelor of education on part time basis at the time the research was conducted. She was an enthusiastic teacher who loved teaching Mathematics, so she said during the interview.

Teacher four – James

James was a male teacher aged between 31-40 years, with 9 years teaching experience in the primary school. He had a Primary Teachers Diploma with majors in Mathematics and Science. He was teaching Mathematics in Grade 6 at the school.

3.4.3 Research site three

This research site was in a rural area. It is a community school. A community school is one that is built by the community members and government assists by hiring teachers and providing teaching materials for the school. The enrolment from Grade 1 to Grade 7 in the school was about 300 learners. It is a school that does not perform very well in the Grade 7 external examinations, according to the Examination Council of Swaziland. The school had a single stream, from Grade 1 to Grade 7. The learners attending at this school are from the rural area in which the school is located. Some of these learners walk for about 5kilometers to the school. Since the school did not have boarding facilities all the learners were day scholars. There were two female Mathematics teachers, Annah and Juliet, who were involved in the research from this school.

Teacher five – Annah

Annah was a female teacher whose age was in the range 51-60 years. She had a teaching experience of 28 years teaching Mathematics in the primary school. She did a Primary Teachers Certificate (PTC) and later upgraded herself to obtain a National Primary Diploma in Education (NPDE).

Teacher six – Juliet

Juliet had 21 years of teaching experience; she was in the 41-50 age bracket. Her qualification was a Primary Teachers Diploma with majors in Mathematics and Science.

3.5 DATA COLLECTION PROCEDURES

Data were collected through the use of a questionnaire, semi-structured interviews and review of the teachers' official books. The researcher decided to use these methods of data collection to reduce researcher and participants' bias. Cohen, et al., (2007) allude to the fact that the use of only one method of data collection may not give a complete picture of the phenomenon under study. The authors say in order to develop confidence of the researcher on the validity of collected data, it is imperative to use different methods to collect the data. This is because each method has its strengths and weaknesses. Hence, an over reliance on one method may result in a bias in the way the phenomenon under study has been understood. Cohen, et al., (2007) say "the more the methods contrast with each other, the greater the researcher's confidence" (p. 141).

In this study if the results of the questionnaire survey are in agreement with the interview, the researcher will be confident that he has correctly assessed the use of the LCP in the teaching of Mathematics in primary schools in Nhlangano, Swaziland.

3.5.1 Questionnaire

The questionnaire was chosen because it is most appropriate for collecting descriptive data. It was also used because it can collect many different kinds of data. It is quick and costs less than the observation and experimental method. The purpose for using the questionnaire was to strengthen validity of the data, collected through the semi-structured interview, and the analysis of the teachers' official books. The questionnaire was adapted from the one used by the Centre for the Study of Learning and Performance (CSL, 2007). This questionnaire was once used in a study conducted in 2007 by the Centre for the Study of Learning and Performance at Concordia University, in Montreal, Quebec. The study was on teaching and learning strategies used by teachers in the classroom.

The researcher first gave the participants questionnaires to fill in and they were collected after 3 days. The researcher used it to determine the teachers' understanding of the LCP approach in the teaching of Mathematics and find their perspectives and experiences in the use of the LCP approach. The questionnaire contained close-ended questions. It began with a set of personal questions which sought to get the biographical details of the participants, their academic qualifications and teaching experience. Section A of the questionnaire contained questions with responses based on a five Likert scale. These questions sought to find the teachers' conceptions, perspectives, and experiences in the use of learner-centred methods in teaching Mathematics. Section B of the questionnaire contained questions that sought to find the teachers' classroom practice in the teaching of primary school Mathematics. To achieve a high response rate from the respondents, the researcher hand-delivered the questionnaires to the participants and also personally collected them after they were filled in by the teachers.

3.5.2 Semi-structured interviews

The use of the semi-structured interview is one of the data collection methods used in qualitative research. Kvale (1996, in Cohen, et al., 2007) sees the use of an interview as a shift from regarding information as external to the participant to acknowledge the fact that knowledge is generated between people through conversations. Knowledge should be seen as "constructed between people through conversations, generating data" (Cohen, et al., p. 349).

Through an interview, people are able to give their point of view on how they understand situations. During an interview, it is possible to ask probing questions to get a clearer understanding of the participants' point of view. It is for this reason that the researcher decided to use the interview method in to understand the teachers' opinions and experiences on the use of LCP in the teaching of Mathematics. The interview schedule used in data collection was also discussed with colleagues to ensure its clarity.

3.5.3 Review of teachers' official books

The teachers use two main official books in the teaching of Mathematics in Swaziland. These are the scheme of work and the teachers' lesson preparation book. The scheme of work outlines the topics to be covered, teaching materials to be used in teaching the topics, and the methodology to be used in teaching the topics. The teacher's lesson preparation book has lesson plans for each lesson taught.

According to Mtitu (2014), an analysis of a teacher's official books can give valuable information about the teacher's classroom practice. In this study, the analysis of the teachers' official books was used to find the main method used by the teachers in teaching Mathematics.

3.6 ETHICAL CONSIDERATIONS

The researcher adhered to the ethical provisions to protect the participants' identity throughout the study. This means the researcher did not disclose the identities of the participants, pseudonyms were used, instead. The information they gave was not disclosed as to who gave it. The researcher shall keep all the data gathered during the research in a locked cabinet, accessed only by the researcher, for 5 years. Thereafter, the data shall be destroyed.

The researcher observed all the research ethical issues according to the UKZN Humanities & Social Sciences Research Ethics committee policy. The researcher thus sought permission from participants and gatekeepers before the commencement of the study. Consent was granted by the Ministry of Education and Training. The researcher also sought permission from the head teachers to conduct the research in the schools that were selected as research sites by the researcher. After getting consent from the head teachers, the researcher then approached the teachers who would be participants in the research. Two teachers who met the stated profile were selected from each school. It was explained to the participants what the research sought to find. It was also explained to them that participation in the research was voluntary. They were assured that their identification would be protected during, and after the study. The participants also consented to participate in the research.

3.7 DATA ANALYSIS

Data collected in this study was in the form of text. Schutt (2011) says qualitative data gives an insight of the participants' thought patterns and reasons they act in certain ways. Data analysis involves finding patterns in the data and categorizing it into themes to understand the participants' thought patterns.

According to Schutt (2011) the process of qualitative data analysis involves the following stages: documentation, coding/categorizing, finding patterns/themes, and reporting the findings. Documentation involves transcribing the data to a word document. The researcher writes a record of the collected data for easy tracking during the data analysis stage. This record could be short notes, outlining the research site and what happened during the data collection process for each case.

In this study, the researcher transcribed the audio-recorded interviews to a text document. The data were then analysed using thematic analysis. Clarke and Braun (2013) define thematic analysis as "a method for identifying, analysing, and reporting patterns (themes) within data" (p. 6). Braun and Clarke, (2006, quoted in Clarke and Braun, 2013) say the process of thematic analysis goes through six stages, which are: acquainting oneself with the data, assigning codes, developing themes, revising themes, describing and naming themes, and writing up. The coding/categorizing process involved reducing the qualitative data into simple categories or codes that represented an important aspect of LCP. These codes led to the identification of patterns or themes.

In this study, the themes were developed according to the research questions. The main themes developed were, 'the teachers' conceptions of LCP', 'the teachers' experiences in the use of LCP', and 'the teachers' pedagogical approaches in teaching Mathematics'. These themes emerged through the process of identifying codes in the data, i.e., identifying common issues that were common to all responses (Brikci, et al., 2007). For an example, codes identified in the data were the issue of the use of English as a language of instruction in teaching, lack of professional support and overcrowding in the classrooms. These were summarised under the theme 'teachers'

experiences in the use of LCP'. All the identified codes were summarised to themes that were representative of the teachers' views.

The researcher did member-checking with participants, i.e., each participant was shown the transcribed data involving him/her before writing the findings of the study. This was to allow the participants a chance to check if what had been transcribed correctly states what they said during the interview. They were allowed to make corrections where they felt their views were not correctly captured.

The reporting stage involved summarizing the results of the study based on an interpretation of the relationships/themes found in the data. This involved enumeration of the data and searching for relationships in the codes (Fereday & Muir-Cochrame, 2006). Enumeration involved quantifying the data, enabling the researcher to use quantifying words such as "many," "a few," and "all," in the reporting process (Fereday, et al., 2006).

3.8 LIMITATIONS

Just like most research, this study had some limitations. As it was carried out in only three schools, the results may only be applicable to the teachers of Nhlangano town, where the study was conducted. Hence, the results may not be generalised to the whole country.

Another limitation was the use of a questionnaire to gather data. The questionnaire did not provide respondents with a chance to explain or get clarification before answering the questions. (Knortz, 2009) says it may also be a challenge to express one's opinions on a five-point scale rather than through a verbal response.

The teachers may not open up on some of these issues in fear that they may be victimised by the employer if they are honest about them. However, the researcher assured the participants that their contributions would not be used for any other purpose except for this study.

3.9 RELIABILITY AND VALIDITY

Validity of a study refers to the extent to which it truthfully reflects or measures the phenomenon being studied. It is concerned with the study's achievement at assessing what the researcher wanted to assess. On the contrary, reliability is concerned with the precision of the data collecting instrument or procedure. To ensure validity and reliability of the instrument used, the researcher adopted an instrument that had been tested and used in a prior research study.

There is a difference between the quantitative and qualitative research approach. Quantitative research is mainly concerned with "causal determination, prediction and generalization of findings", while qualitative researchers are interested in "illumination, understanding, and extrapolation to similar situations" (Golafshani, 2003, p. 600). Thus the resultant knowledge of a qualitative research is of a different type than knowledge resulting from quantitative research. As these approaches to research are different, Agar (quoted in Golafshani, 2003) proposed that different terms be used in the qualitative approach to replace validity and reliability. These terms are trustworthiness, and credibility.

The researcher used 3 instruments in data collection. This involved the questionnaire, structured interview and an analysis of the teachers' official books. Hence, during data analysis, the researcher cross verified each participants' data from the questionnaire, semi-structured interview and document analysis to establish consistency. The data collected through the different instruments also complemented each other, in that, for an example, the semi-structured interview provided information that could not be collected through the questionnaire. Krefting (1990) says that triangulation ensures that the weaknesses of one data collecting method are compensated by the use of another method. Hence, a holistic view of the issue under research is attained when different methods have been used.

3.10 CHAPTER SUMMARY

This chapter has defined the methodology that was used in the study. The chapter alluded to choosing the qualitative method of research as it was best suited to the research topic. The qualitative method allowed an in-depth study of the use of the learner-centred pedagogy in the teaching of Mathematics. Through this research method the researcher gained an insight into the teachers' conceptions of the learner-centred pedagogy approach and got the teachers' experiences in the use of LCP. In this chapter, the researcher has stated how the sample was selected, i.e., using purposive sampling procedure with maximum variation. The chapter also states that data were collected through the use of a questionnaire, semi-structured interview and an analysis of the teachers' official books. The use of the three methods of data collection was for triangulation, i.e., to enable the data collected through the different instruments to complement each other. The chapter has stated the ethical considerations observed in carrying out the study. A brief outline of data analysis has also been discussed. The limitations of the study were stated. The chapter finally discussed measures that ensured reliability and validity of the study. The next chapter will be on the presentation of data and findings in the case studies.

CHAPTER 4

PRESENTATION OF DATA AND FINDINGS

4.1 INTRODUCTION

This chapter presents the results of the study from all three research sites. The research sites were three primary schools in the Shiselweni region, in Nhlangano town, where the researcher collected data. The objective of the study was to investigate the teachers' understanding of the use of pragmatic LCP as well as how this understanding influenced their classroom practice in the teaching of Mathematics. The results are presented according to the research questions. Therefore, data was analysed on the basis of the following research questions:

- What are the teachers' conceptions of the learner-centred pedagogical approach to the teaching of Mathematics?
- What are the teachers' experiences in the use of the learner-centred approach?
- What are the teachers' pedagogical approaches to their teaching of Mathematics?

As mentioned in Chapter 3, data were collected through a questionnaire, semi-structured interviews, and document analysis.

4.2 TEACHERS' CONCEPTIONS OF LCP IN THE TEACHING OF MATHEMATICS

4.2.1 The teachers' understanding of LCP

With reference to teaching and learning, the concept of LCP is interpreted in a variety of ways in the literature. Some authors interpret LCP in terms of the method of teaching used,

others put emphasis on a fluid teacher-learner relationship, and still others focus on consideration of learners' prior knowledge when presenting new knowledge (Msonde, 2011). When asked about their understanding of LCP, one of the teachers stated;

> In this method it is not the teacher who is standing in front of the pupils telling or imparting knowledge. I can say the teacher is just facilitating or helping where some learners are encountering problems. The teacher just assists the learner and focus on the important points. Most of the work is done by the learners, unlike how we were taught when we were still young when the teacher would stand in front of us telling us everything. But here you just facilitate and help where the learner is encountering a problem.

Given the above assertion, it could be argued that in LCP the teacher plays a facilitative role to ensure an active involvement of the learners in the teaching and learning process. The learner involvement develops critical thinking and promotes classroom democracy resulting in easy communication of knowledge amongst learners and between teacher and the learners (Freire, 1970). Under such circumstances, we see change of roles whereby the teacher assumes a facilitative role instead of an authoritative knowledge transmitter role. Such an approach is in line with the constructivist approach to learning, as observed by Glasersfeld (1989) and Alemu (2010), who argue that knowledge is not passively obtained but actively constructed by learners. Alemu (2010) contends that learners must be involved in active engagement through problem solving activities. The teacher's role in this set up is to guide learners in framing their own conclusions from these activities. Hence the learners, with the assistance of the teacher, 're-discover' knowledge through an active involvement in learning activities.

Another teacher also understood LCP as a method whereby the teacher plays a facilitative role;

> My understanding is that LCP means you have to get the children doing most of the task, on their own or in groups without the teacher taking the leading role. The teacher just guides on what is expected. The pupils need to work on their own to find the answers. The teacher gives the instructions, which should be clear as to what each pupil, pair or group need to do, and how they should go about maintaining the level of discipline so that there are no disturbances to the pupils who are doing the tasks. The teacher should provide a cushion for those who have problems; they should feel free to consult the teacher when they don't understand some tasks.

The above perception of LCP is also supported by Mehdinezhad (2011) as he registers that the learner-teacher relationship has an important role in facilitating learner achievement and democratic education in the classroom. He says the teacher should build a personal relationship, "based on trust and empathy" with the learners (Mehdinezhad, 2011, p. 50). Mehdinezhad further observes that a good learner-teacher relationship creates a positive classroom atmosphere resulting in learners' success. The author says such a classroom environment supports LCP. Jotia (2010, p. 114) also contends the same point as he says that schools should be democratic spaces. He says that the classroom should be a place where a "free flow of ideas" should be encouraged to take place. A case could be made that LCP supports the democratic approach to teaching and learning as argued by Vavrus, et al., (2011) who notes that using LCP allows learners to practice democracy in the classroom through negotiation, collaboration and sharing views. Hence, LCP creates a positive classroom atmosphere which supports democratic values and principles.

Another teacher had the following to say about LCP;

> The learner-centred approach is one of the approaches that we use in teaching. In fact there is also the teacher-centred approach; however, in the teaching of Mathematics, we

> recommend LCP because this approach involves the learners. More work is done by the learners instead of the teacher in LCP. The understanding is that when learners are actively involved in learning activities they understand better, because they are mentally engaged. Learner-centred pedagogy involves the learners, unlike in the teacher-centred approach where the teacher delivers a large portion of the content while the learners passively listen to him/her.

In the words of Freire, passive learning suppresses the intellectual development of learners in that the learners are turned to empty vessels, waiting to be "filled by the teacher" (Freire, 2005, p. 72). In Freire's banking model, "good" learners are those that submissively receive knowledge they are 'filled' with and store it through memorization. The indoctrination of learners suppresses creativity and inquiry-based learning. Freire (2005) says portraying the learners as ignorant makes them docile and dependent on the teacher, who possesses all the knowledge they need.

The teachers' understanding of LCP is that learners should be 'actively' involved in the teaching/learning process. This view of LCP is supported by Schiller (2009) who believes that learners should be active participants in the classroom. The learners' active involvement in a lesson enables them to construct knowledge they can own and understand better. For instance, Dewey (1916, quoted in Jotia, 2010) argued that the process of learning should instil learners' ability to think reflectively and critically. Dewey (1916) also proposes that education should inculcate democratic principles in the learners in order to prepare them to be active participants in a democratic form of governance. On the other hand, Jotia and Sithole (2016) relay the message that education should be based on the principles of pragmatism, whereby learners are emancipated from 'banking education'. The authors believe the learners will be emancipated by

being taught through democratic pedagogies that develop practical skills in learners. Such pedagogies will develop biophilic relationships instead of the necrophilic ones promoted by banking education. Democratic pedagogies require that the teacher as an authoritative knowledge possessor and learner as ignorant receptacle relationship be reviewed. Instead, a "more robust and productive learner-centred pedagogies which repel the oppressive and irrelevant technicist approach to issues related to curriculum and pedagogy" be embraced (Jotia, et al., 2016, p. 11).

Another teacher from research site 2 registered that;

> My understanding or my knowledge of the LCP to teaching Mathematics is that it is whereby the learners are more involved in the teaching than whereby the teacher is involved. In LCP, the pupils teach each other. What I mean is that one pupil explains certain concepts or clarifies to the other learners what he/she understands about the topic. The learners respond to what he/she is asking or what they understand about that topic. The learners will help each other.

Given the above observation, it could be concluded that under LCP, the learners are more involved in the lesson than in the traditional teacher-centred approach. As reflected above, the teacher conceived that LCP is important to encourage collaborative learning amongst the learners which consequently make them to value the knowledge they learn. The above referenced teacher further noted that whenever the learners do things themselves, they do not easily forget.

This interpretation is in line with Anthony's (1996) conception of LCP. Anthony (1996) believes that learners should be involved in active learning methods to attain meaningful learning. On the other hand Taber (2011) also shares the same view with Anthony when noting that meaningful learning takes place when learners actively construct meaningful understanding from activities they are involved in. He contends that "at some level, constructivism implies that

an individual has to create knowledge themselves, and clearly the feeling of discovering a pattern oneself rather than just being told, can have considerable motivational value" (Taber, 2011, p. 56). Taber argues that meaningful learning is a result of the learner's process of meaningful interpretation of new experiences using current knowledge. Therefore, according to Taber, there will be meaningful learning when learners 'discover' knowledge from activities they are involved in.

Another teacher from research site 3 concurred with this assertion by noting that when a teacher uses the expository method of teaching, the learners easily forget the knowledge. But if they are involved in the lesson, they enjoy it and own what they learn, and remember it. This teacher further mentioned the importance of using the learners' prior knowledge to build new knowledge. She gave an example that when teaching Shapes, firstly, she asks the learners to name the Shapes they know. Then she would introduce a new Shape by associating it with the ones they know. For an example, to introduce a rhombus, she would first ask them to give all four-sided shapes they know. Then she would introduce a rhombus by associating it with the four-sided shapes the learners have mentioned. The importance of using prior knowledge in teaching is the basis for constructivism. According to constructivism, prior knowledge is used as a "bridge" to introduce new content (Gagnon, et al., 2006). Under this approach, teachers should check if learners possess the necessary pre-requisite knowledge on which to 'build' the knowledge they want students to learn (Gagnon, et al., 2006). This approach is based on Gagne's theory of set induction and Ausubel's theory of advanced organizer (Gagnon, et al., 2006), which states that knowledge is organized in hierarchies in memory. Any new knowledge is learnt meaningfully if it can be attached/related to already existing knowledge.

The same teacher also conceived LCP as an approach in which there must be cooperative learning amongst the learners. She emphasised the importance of group work and/pair work. She believed learners would learn better if they have had a thorough discussion amongst themselves on a concept. She said, "they should argue, they should argue about concepts". She also mentioned that when forming group work, the learners should be mixed according to their abilities so that they can help each other. She observed that when the learners work in groups they enjoy because they find themselves able to do something and it sticks in their mind.

She added that the teacher's role in this set-up is to monitor if the learners understand what they are doing. If a learner was left behind under LCP, it is essential that the teacher helps that learner to catch up with the others. This means the teacher must show that he/she cares about the learners and wants to see them succeeding. This will create the relationship of mutual trust between the teacher and the learners (Mtitu, 2014). This also motivates the learners to do better through self-regulation strategies (Zimmerman, 1989).

Even though the teachers had different conceptions of LCP, their general understanding is that it is associated with active learning methods, e.g. discussion, group work, pair work, etc. All the teachers' definitions of LCP emphasised the importance of considering learning in terms of the constructivist theory of learning. A truly learner-centred pedagogy should incorporate all its aspects. That is, content selection, active involvement of learners in the lesson, and the classroom environment should all address learners' needs and interests. Mehdinezhad (2011) says a learner-centred pedagogy is characterised by a focus on meeting learners' needs and interests through a consideration of their experiences and abilities. That is, in selecting the content, the learners' needs and interests must be put first. The content selection process must

focus on the needs of the learners not those of educators and administrators (Mehdinezhad, 2011).

Teachers in a learner-centred class must consider the learners' experiences. That is, their existing knowledge. The new content must then be presented such that it relates to the learners' existing knowledge so that learners have 'relational understanding' of the content (Skemp, 1978, quoted in Shield & Galbraith, 1998). Cooperative learning must be encouraged in a learner-centred class to encourage 'socio-constructivist learning' (Albert, 2000; Palincsar, 1998).

Mtitu (2014) posits that due to the different interpretations/conceptions of LCP, it is implemented in different variations across the world. However, the bottom-line is that all the interviewees share the view that LCP is an important and productive method in the teaching-learning process, which should be used in the teaching of Mathematics.

4.2.2 The use of word problems in the teaching of Mathematics

As stated in Chapter 1, Freire (2005) proposed a learner-centred teaching approach called the problem-posing pedagogy. In this approach, the learners should learn to solve problems through collaborative discussions. Through these problem solving activities, the learners develop creativity, critical thinking skills and democratic education (Jotia, 2011; Freire, 2005). The use of word problems in Mathematics is to create scenarios that will result in problem solving, which is an important aspect in LCP.

When the teachers were asked to give their views on the use of word problems in their assessment of learning, they gave different views but with an underlying concern of an inability of learners to solve such problems. One teacher said;

> I think word problems are a good thing to happen. I usually tell my learners that you can never find a situation whereby you are just given numbers to work on; the numbers

> should come from a certain situation. So word problems create the situation and I encourage learners to understand the situation first so that they can come up with their own different methods of solving the problems.

This teacher was in support of the use of word problems in Mathematics. He clearly stated that word problems create the situation or context for a problem. Creating a context for a problem shows learners that Mathematics is not abstract but is about solving everyday problems (Cangelosi, 1996). The teacher further puts forward the following difficulty in the use of word problems in teaching;

> The children try to work out the word problems but the challenge we have is that they just look for the numbers from the word problem, instead of trying to understand the comprehension part. That is one challenge we usually face. So as a teacher I always try to encourage them to analyse the given information before rushing to work on the problem because, when lazy, children rush to the numbers and they start working without even knowing the method they should use.

Another teacher also recorded that;

> I don't know how I can put it but these word problems are difficult even to some teachers. For the pupils once there are too many words, there is so much difficulty. Once there are too many words, the comprehension of the problem and information processing becomes complex for learners.

The above teacher expressed the fact that it is not only the learners that have a challenge with word problems but some of the teachers also have a challenge with word problems. The teachers attribute the difficulty in solving word problems to the use of English language in presenting them. They believe the language becomes a barrier to a clear comprehension of a word problem.

This assertion is in line with the findings of Gooding (2009) that children have difficulties with mathematical word problems. She categorised the difficulties into five areas. These are, "reading and understanding the language used within a word problem, recognizing and imagining the context in which a word problem is set, forming a number sentence to represent the Mathematics involved in the word problem, carrying out the mathematical calculation, and interpreting the answer in the context of the question" (Gooding, 2009, p. 31). Of these areas of difficulty given by Gooding (2009) the teachers stated that learners have difficulty on comprehending the language used in stating a word problem. One of the teachers said;

> Perhaps it can be a good idea if they (word problems) are written in the learners' first language. It would be easier for the children to understand the information. Possibly, it is better with the pupils who are in towns; the situation is better compared to that in rural areas.

All the teachers said their learners have challenges in working out word problems. They said this made it difficult for them to use word problems in their teaching and assessment of learning. Even those that used the word problems in their teaching resorted to drilling the learners on how to solve these word problems. They said they told the learners to look for key words, e.g. 'altogether' vis-a-vis 'addition' or 'the sum total'. So the learners do not need to understand the word problem but just 'guess' the operation due to a key word they see in the word problem.

Learners who solve problems through guessing cannot be said to be involved in a problem solving activity. Such learners will be unable to interpret the answer in the context of the question (Gooding, 2009). Gerofsky (1999) also asserts that the use of word problems in the teaching and learning of Mathematics gives learners challenges. She laments that "word

problems in school Mathematics are traditionally assigned as a sort of bitter medicine that will make you better" (p. 169).

In trying to solve word problems, learners have a number of difficulties. One of the difficulties is in understanding the word problem, which is written in a second language. Another difficulty is that learners fail to visualise the context in which the word problem is set. They may also fail to write an appropriate number sentence to represent the word problem and some fail to interpret the answer according to the context in which the word problem was set. In summary, a case could be made that the use of word problems gives learners a challenge.

4.2.3 The use of LCP in teaching Mathematics

Some scholars conceptualise LCP in terms of methods of teaching used. These methods of teaching are broadly divided into two types, participatory and non-participatory. In this conception of LCP, the extent to which one is said to be using LCP is determined by the degree of learners' involvement in the classroom activities.

However, Mcombs (2001) considers learner-centred teaching in terms of a consideration of the learners' interests, needs and experiences together with "teaching practices that are most effective in promoting the highest levels of motivation, learning, and achievement for all learners" (p. 186). She posits that learner-centeredness is not only about a method of teaching used, but it also involves the teacher's ability to create a conducive classroom environment for learning.

When the teachers were asked to give methods they believed fell under LCP, they gave active learning methods, e.g., discussion, group work, pair work, etc. All the methods they gave are those that engage learners actively in the learning process. When asked which method falls under LCP, one teacher said;

I think it's the discussion and the group work.

When probed why he chose the above methods, he said;

> The discussion method involves more of the learners, because they talk in the group, one just speaks out his/her view to the rest of the group. Yes, I think the discussion and group work go together.

Another teacher responded by saying;

> The demonstration method is learner-centred. I can say it is learner-centred because the learner is hands-on; that is why I am saying it is the demonstration because he/she will demonstrate how something is done.

In their view, the demonstration method is good since it is learner-centred.

When asked about their opinion on the use of LCP in the teaching of Mathematics, all the teachers said the LCP approach is a good approach to the teaching of Mathematics. They said this is because in this approach the learners discover concepts by themselves and they own and value that knowledge. One of the teachers said;

> I think this method is the best when teaching Mathematics because it involves the pupils a lot, and when they are more involved, they gain a lot, rather than when it is always the teacher delivering information. When they do the work they collaborate.

Another teacher from another research site said;

> It is a good approach, since it gives the learners the opportunity to be pragmatically involved in solving problems.

Another point raised by one of the teachers is that this method involves even the introverts in the lesson, since they are free to talk to their peers and ask questions which they would not otherwise

ask when learning is teacher-centred. However, the teachers' concern about using LCP was that it is time consuming. One teacher put it this way;

> I think there are advantages and disadvantages of LCP. So if you tell them everything, they forget easily. But coming to disadvantages, you find that you have to do one lesson over a period of two days because the approach is time consuming.

The teacher alluded to the fact that LCP was a good teaching approach but lamented that a lot of time was used to teach a lesson in this approach, hence one might not finish the syllabus if using this approach.

4.3 THE TEACHERS' EXPERIENCES IN THE USE OF LCP

4.3.1 The teachers' training on LCP

Zan and Martino (2007, quoted in Alemu, 2010) believe that effective use of active learning methods in Mathematics require an academically and pedagogically competent teacher. They contend that teachers usually emulate their lecturers in the way they teach. They say "if they learned mainly through the active learning/student-centred methods, they prefer to use these methods in their own future teaching" (p. 96). Hence, an assertion could be made that teacher training institutions should use methods of teaching that they expect their products to use in their teaching when they finish training.

When asked if they received any training on LCP, all the teachers responded to the affirmative. However, some of the teachers thought that this training was not enough for one to effectively implement LCP in their teaching. One of the teachers said;

> At college we did not learn much, but they taught us that we should use this information and they taught us how to do it but not in details.

When probed on the nature of training received at college on LCP, the teacher said;

> At college you are not taught how to implement the approach in a classroom situation. The lecturers present the information abstractly. You find that when you get to the classroom the situation is different. You have to apply what you were taught at college, at the level of the learners.

This teacher observed that the training received at college was not at the practical level. It was not exactly at the level of implementation in a classroom situation. He said this was due to the fact that the approach is taught only in theory without practice by the lecturers themselves.

This teacher's experience relates to the observation by Alemu (2010) who states that research findings reveal that lecturers fail to demonstrate the use of active learning methods in their own teaching. They, however, recommend that their students should use these methods when they teach. Alemu therefore notes that "there is a gap between theory and practice, i.e., between what teachers are told to do and what the college lecturers do in their teaching" (Alemu, 2010, p. 10) when training the teachers. This, Alemu (2010) notes, is due to the fact that the lecturers lack the necessary pedagogical content knowledge to enable them to use active learning methods when teaching.

Another teacher mentioned that she got a lot of information while she upgraded her education from a PTC to NPDE. She said;

> I did a Primary Teachers Certificate (PTC) and I enrolled at UNISA in 2005 and gained a lot there doing the NPDE. A lot was done there in two years which opened my mind regarding the learners' involvement in the teaching-learning process. When the teacher talks all the time, the learners get bored and tired and consequently engage in activities which are irrelevant.

This teacher said she gained a lot of information on LCP during her training. She sounded confident on the training she had on the use of LCP. Another teacher also remarked that at preservice training they were taught about LCP. He remarked that;

> At pre-service training, they did a wonderful job, which is why I am able to use the learner-centred approach. We were taught about these approaches, so we are well versed about them.

Therefore, it seems the teachers in the field had training on LCP that varied at different levels. This training varied from very scanty to nearly enough information. That is, it ranged from abstract to practical information. When asked how their pre-service training influenced their choice of teaching approach, most of them said pre-service training influenced them to use LCP. However, they said there were some challenges they faced as they tried to use LCP in their teaching. One of the challenges is that the approach is time consuming. Some of the teachers lamented that if one can use LCP in their teaching consistently, they would not finish the syllabus. A comment from one teacher was that;

> First of all I can say that the LCP is time consuming because, for an example, if I have to organise groups, time is wasted as they organise themselves. So it is time consuming.

This teacher's observation was that time was lost while organising the learners to form groups. Another teacher commented about time on LCP. She said a lot of time was needed for the learners to discuss in groups. After the discussion, one learner had to present their findings for each group and afterwards the teacher had to summarise the lesson. This, she said required a lot of time. Overall, these teachers believe that using LCP is time consuming. This perception on LCP is confirmed by Mtika and Gates (quoted in Vavrus, et al., 2011). They say the national examinations put teachers under pressure to finish the syllabus. They also note that these

examinations test knowledge at recall level. Hence, teachers do not see a need to let learners 'discover' knowledge when they will only be required to recall information in examinations.

Alemu (2010) also confirms this observation that active learning methods are time consuming compared to expository methods of teaching. He says, "active learning approach may take more time than, for example, a straight lecture from the front of the room" (Alemu, 2010, p. 78).

Another teacher mentioned the issue of classroom control in LCP. The teacher said in his experience it became a challenge to control the learners during group work sessions. He said;

> You cannot control them once they start discussing, others just make noise. Instead of doing the job, they get an opportunity to talk with their friends.

Another experience mentioned by one of the teachers was that of no support from colleagues who demotivated him on the use of LCP. The teachers he found in the field told him this approach would not work in his school, especially since it was a school in the rural area. So he says it was difficult to teach using LCP when the other teachers were using the traditional approach to teaching. He said;

> Over time I am gradually changing to learner-centred approach but I'm still not hundred percent there because it is a process. There should be a process followed by the school from the lower Grades. So if you are teaching the higher Grades you find yourself taking the whole year trying to change them (learners) into understanding your method of working with them but by the time they reach Grade seven, if you started teaching them in Grade five, you find that their level of understanding is better, even their attitude towards Mathematics.

So this teacher's experience was that it becomes a process for the learners to get accustomed to the learner-centred approach when they had been used to the teacher-centred approach. Perhaps that is what caused problems of classroom control when the teacher introduced LCP.

4.3.2 LCP and the learners' ability to stay on task

A general analysis of the questionnaires speaks to the fact that teachers believe that when learners are given a platform to solve problems on their own, they are likely to stay on task and remain focused. This was against what one of the teachers said during the interview that learners would start talking to their friends when given a task in group work. When the teachers were asked if their learners could work independently without relying too much on the teacher, four responded on the positive. Only one responded on the negative. This gives an impression that most of the learners in the schools visited could work on their own, with the teacher playing a facilitative role in the teaching process. Hence, the learners were ready for the learner-centred approach. The teachers just needed to be empowered with the right skills to facilitate learning. An observation by Gutstein (2003, quoted in Alemu, 2010) also solidifies this point when observing that when learners are involved in active cooperative learning methods they develop "self-dependence, rational thinking, love and hardworking" (p. 90).

4.3.3 LCP and learners' ability to work individually

When asked if their learners worked well when given a task individually, five out of the six teachers disagreed with the statement and only one agreed. This means that the learners in these schools worked well when given tasks in a group as opposed to working individually. This is in agreement with Effeney, et al., (2013)'s assertion that social interaction is important for effective learning to take place.

On the question of whether learners understood concepts better when they had been explained by the teacher or when they had discovered them themselves, the teachers responded by saying the learners understood concepts better when they had been explained by the teacher, while they listened attentively. These teachers' belief is against the constructivist theory of learning which believes that learners must be actively involved in the learning process for them to understand better (Mcombs & Whistler, 1997). As stated in chapter 2, regarding acquisition of new knowledge, understanding is defined by Skemp (1978, quoted in Shield, et al., 1998) to be at two levels. There is relational understanding and instrumental understanding. Relational understanding refers to the case when a concept has been meaningfully learnt, whilst instrumental understanding relates to learning by rote. Skemp (1978, quoted in Shield, et al., 1998) asserts that for relational understanding to take place, the learner must be actively involved in the learning process. On the other hand, instrumental understanding occurs when learners have been told information and memorised it without linking to existing knowledge.

By saying the learners understood better when concepts were explained by the teacher, the teachers' conception of understanding could refer to Skemp's instrumental understanding. It could mean that the learners are able to reproduce the information during assessment.

4.4 THE TEACHERS' PEDAGOGICAL APPROACHES IN TEACHING MATHEMATICS

4.4.1 Methods of teaching used by teachers in Mathematics.

When asked about the methods used by the teachers during the teaching/learning process, six teachers responded that they use the discussion (group work) and demonstration method. One teacher said she uses the discussion method, demonstration and the question and answer method.

The teachers said they preferred to use group work because when the learners are actively involved, discussing concepts, they do not easily forget those concepts. One of the teachers said;

> In my teaching, I usually use two teaching methods or strategies. I use the demonstration method and I also use the discussion method. As to why I use the demonstration is because I believe that as a Mathematics teacher I have to demonstrate how to do the work by demonstrating. That is why I recommend the demonstrating strategy for teaching. Also there is the discussion. We also use this method where I usually ask them to form groups and discuss a concept and learn from one another.

Another teacher said;

> I find that they easily forget what you teach them. You have to involve them in everything. When you involve them in the teaching/learning process, they enjoy because they find themselves able to do something, and it sticks into their brains.

Another teacher said the discussion method (group work) works well for him. He said, "You know what, in Mathematics, I have discovered something; the students learn better when they learn from one another, so that's why I strongly encourage the discussion method". He said in group work, the learners are free to ask for clarification from their peers, because they are not afraid of them. He said asking from the teacher is a challenge for some learners since they may fear the teacher.

On the question of whether the teachers did all the talking while in class, one teacher said she never did that while five said sometimes they did all the talking while in class. As noted in Chapter 2 of this thesis, Msonde (2009, quoted in Msonde, 2011) asserts that LCP is not so much about a method of teaching; rather it is about how the learner is engaged in the teaching/learning process. The main idea of LCP is maximizing the mental engagement of learners so that they

learn. The main issue is maximum participation of the learner in the learning process. Combined with this active involvement, the classroom environment must also be conducive for learning (Mcombs & Whistler, 1997). So a conclusion of whether a lesson is learner-centred or not cannot be drawn only by considering the method of teaching used to teach the lesson.

4.4.2 Learners' identification of strategies for solving problems

When the teachers were asked if they encouraged their learners to identify strategies for solving problems, five teachers responded positively. This means that the learners in these classes were involved in identifying strategies for solving problems. Identifying strategies for solving a problem is a very important step in problem solving. The learners should think about the problem and identify several strategies for solving it. This mental engagement of the learners results in critical and creative thinking skills. Learner-centred pedagogy recommends that teachers should encourage learners to use various methods of finding answers. From the questionnaire, four of the six teachers said they always encouraged their learners to use various methods of finding answers. This makes the learners to think critically and be creative instead of being channelled to one method.

Identifying strategies for problem solving also gives learners a chance to put forward and defend their ideas. This inculcates the principles of participation, democratic principles, critical thinking, and problem solving skills (Jotia, 2011). Learners therefore come up with different strategies to solve a problem rather than trying to memorise one method given by the teacher.

4.4.3 Engagement of learners with peers in discussions

In another question the teachers were asked if their learners engaged in constructive discussion with their peers. In order for learners to have meaningful learning, discussion with

peers is recommended by educators. Winstead (2004) believes that social interaction provides motivation to learners. Social interaction is also an important aspect of the constructivist theory of learning which forms a basis for LCP (Palincsar, 1998).

When asked if their learners engaged in constructive discussion with their peers, one teacher responded negatively while five responded positively. The teachers were then asked if they encouraged group work among their learners. Two teachers said they always encouraged group work among the learners during lessons, while four said they did that sometimes. So the teachers' classroom practice was that they did not always encourage cooperative learning among the learners.

4.4.4 Analyses of the teachers' lesson plans

The analysis of the lesson plans was to ascertain how the teacher's pedagogical thinking during lesson planning reflected LCP principles. Hence, the researcher analysed the teachers' lesson plans according to Gagnon's (2006) "Constructivist Learning Design". According to this learning design, the lesson plan should firstly have a 'situation'. This related to the instructional objective(s) in the case of the Mathematics lesson plan. Secondly, there should be a 'bridge' linking existing knowledge and the new knowledge. In the case of the Mathematics lesson plan this relates to the introduction of the lesson. Thirdly, there are 'groupings', which relates to the method used in the lesson. Fourthly, there should be 'reflections' on the lesson. This relates to the conclusion or summary of the lesson. The teachers' lesson plans were analysed to establish if they had all these elements to be considered learner-centred.

An analysis of the teachers' lesson plans revealed that the teachers' preparation for their lessons was indeed guided by basic principles for LCP. The lesson plans showed that the teachers stated the instructional objectives correctly in behavioural terms. Each lesson had an

introduction that linked existing knowledge to new knowledge. The method of teaching stated in the lesson plans was either the discussion or the demonstration method. The lesson plans had a column showing the teacher's activity and another column showing the learner's activity. This shows that when the teachers plan their lessons, they plan learners' activities that will involve them in the lesson. In each step of the lesson, the teachers specified what the learners would do.

The lesson plans also stated that there would be use of teaching materials (manipulatives) in the lesson to aid the teaching/learning process. This is in line with LCP which requires that learners should have manipulatives to help them develop Mathematics concepts (Shaw, 2002). However, even though the manipulatives were listed for each lesson, the teachers did not indicate when and how the materials will be used in the lesson. All the lesson plans did not have a section on reflection, i.e., a conclusion of the lesson. This was the one deficiency found in the lesson plans.

The analysis of the teachers' lessons plans reveals that the teachers' pedagogical thinking during lesson planning reflected LCP principles. Hence, it can be argued that the teachers have a good conception of LCP.

4.5 CHAPTER SUMMARY

The issue of learner-centred teaching is an important issue in 21st century teaching. It is important for the inculcation of critical thinking and democratic education in learners. It is therefore imperative that teachers have a clear conception of the learner-centred approach to teaching to develop learners with these important thinking skills for the development of education in Swaziland. From the findings, the teachers showed that they knew about LCP. However, their conceptions on LCP varied from one teacher to the next. The teachers' level of understanding seemed to be at surface level.

The general common point of agreement by teachers was that learners had to be taught through active learning methods. This is certainly in line with the scholarly observation of the constructivist and progressive education scholars such as Anthony (1996) who contend that learning becomes more meaningful and efficient when the learner is hands-on. This is what Freire (2005) refers to as empowering, emancipatory and transformative learning whereby the learner is given the opportunity to make sense of their world by being engaged in learning. The teaching and learning of Mathematics becomes more fun when learners find out concepts themselves. The following chapter presents a discussion of the findings and suggests recommendations.

CHAPTER 5
DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

The previous chapter presented the findings of the research. This chapter presents a discussion of the findings and a summary of the study. It also discusses recommendations of the research findings regarding Mathematics education in Swaziland. Drawing from the literature presented in Chapter 2 of this thesis, the researcher discusses the research findings and suggests recommendations for further research for the improvement of Mathematics teaching in Swaziland. This study was an investigation of the use of learner-centred pedagogy in the teaching of Mathematics in primary schools in Nhlangano, Swaziland. It examined the teachers' understanding of the use of Pragmatic LCP approach, investigated how their understanding influenced their classroom practice in the teaching of Mathematics.

5.2 THEORETICAL AND METHODOLOGICAL REFLECTIONS

This study was driven by the theory of constructivism, which believes that people construct meanings from experiences they encounter in the environment in which they live and work (Cresswell, 2009). This theory assisted in achieving the results in that when pursuing the interviews, the researcher used open questions which allowed the informants to share their opinions and experiences on the use of LCP in teaching Mathematics. The researcher relied on the information given by the participants to understand how they use LCP in their teaching. This information was interpreted through the social constructivist worldview (Cresswell, 2009). The researcher did not start with a theory but developed themes according to the study's research questions.

5.3 SUMMARY OF THE FINDINGS

Generally the study found that the teachers do not have enough understanding of LCP to enable them to use it with ease in their teaching. Hence, they do not use it fully in their teaching. The findings further revealed that there was lack of professional support, in the form of in-service training to reinforce the knowledge about LCP and its use. There is also a need to review the pre-service teachers' Mathematics curriculum to offer pedagogical content knowledge.

5.4 TEACHERS' UNDERSTANDING OF LCP

Learner-centred pedagogy is an approach to teaching that focuses on learners' active involvement in their learning. The learners have an opportunity to re-discover knowledge, instead of being told by the teacher. The teacher plays a facilitative role in this process of pupil learning. This study revealed that the teachers' understanding of LCP is at surface level; they understood LCP as a teaching approach, where the teacher plays a facilitative role. They believed that the learner should take the centre stage in the learning process. The belief is that when learners are the main focus in the learning process they own the knowledge they 'discover' themselves. The need for the facilitative role of the teacher is dictated by the understanding of the existence of the ZPD. Taber (2011) posits that in the zone of proximal development a learner is unable to work alone, but needs help/support from an experienced person. Hence, the facilitative role of the teacher is to provide scaffolding for the learner to construct knowledge. This means setting tasks that are beyond the learner's experience but within his/her ZPD. The teacher then provides support in the form of questioning and giving hints for the learners to discover knowledge. Taber (2011, p. 52) believes that "the teacher's role is to offer support, and then gradually fade it as the learner masters the task" and his/her ZPD enlarges.

Therefore, by saying the teacher's role is to be a facilitator does not mean the learner should be left alone to discover knowledge. But the teacher should know how to 'scaffold' for learning the desired knowledge and what kind of support to give the learner. Taber (2011) emphasises that learning, according to constructivism, should be learner-centred and teacher-directed.

Most of the teachers also mentioned the importance of the use of learners' prior knowledge in planning learning tasks. They mentioned that it is essential in LCP to check learners' existing knowledge before presenting new knowledge. They said this boosts the learners' confidence and motivates them to learn new knowledge. This assertion is confirmed by proponents of constructivism. Constructivists believe that new knowledge is meaningfully understood if it can be fitted to a learner's existing knowledge structure (Gagnon, 2006; Taber 2011). Hence, the teachers' assertion of the importance of prior knowledge in learning is confirmed by literature.

From the interviews, all the teachers contended that in LCP learners should be actively involved in collaborative learning activities. They believed that when learners worked in groups, they would help each other to make meaning of the new knowledge. The teachers also noted that when the learners are involved in group work they enjoyed the lesson more than when they worked individually. The active involvement of learners in the learning process is the basis for LCP, which is against the banking model of education (Freire, 2005; Anthony, 1996). Through active involvement, the learners develop problem solving skills, critical thinking and democratic skills (Jotia, 2011). Such a state of affairs contributes to learners being pragmatically involved in the learning process, which eventually makes them autonomous intellectuals.

From the teachers' definitions of LCP, it is evident that the teachers understood it in terms of active learning methods. The teachers emphasised the importance to consider learning

in terms of the constructivist theory of learning, which believes that learners construct their own knowledge during the teaching and learning process. This understanding is consistent with what literature says on LCP.

5.5 THE TEACHERS' EXPERIENCES IN THE USE OF LCP

5.5.1 Insufficient training on the use of LCP

When the teachers were asked whether they used LCP in their teaching or not, they all stated that they try to use it but there were challenges they faced. One of the major and common challenge was insufficient training at pre-service on how to use LCP. This could be due to lack of training for college lecturers on the use of LCP. The only training that has been available to the lecturers is from JICA. However, this training is only offered to the Science and Mathematics lecturers. Such training on the use of LCP is necessary for all the lecturers to have a complete shift towards learner-centred from teacher-centred teaching at the college.

The findings of a study by Steiner-Khamsi, et al., (2010) also revealed that the pre-service teacher training curriculum in Swaziland has a strong emphasis on subject content knowledge as opposed to pedagogical content knowledge. This hinders the development of flexibility and adaptability of the teachers in the use of learner-centred methodology in their teaching. This observation was also made by Vavrus, et al., (2011), in a study on teachers' training on learner-centred pedagogies in Sub-Saharan African countries. These researchers noted that the training of teachers is usually centred on the behaviorist viewpoint of teaching and learning. Lecturers in sub-Saharan Africa have been found to use expository methods in their teaching. Lewin and Stuart (2003, quoted in Vavrus, et al., 2011) say lecturers have been found to lecture to student teachers, use close-ended recall question and discourage collaborative

learning among students. The lecturers teach student teachers to use active learning methods but do not model how to use them. This results in the teachers using the same expository methods in teaching learners in the schools as Zan and Martino (2007, quoted in Alemu, 2010) argued that teachers usually imitate their lecturers in the way they teach.

Vavrus, et al., (2011) observe that this situation is caused by lack of pedagogical content knowledge (PCK) on the subjects the lecturers teach at teacher training institutions. Pedagogical content knowledge is beyond knowing the content of a subject, but knowledge of how to effectively teach the content to learners. This involves breaking topics into simpler units, using effective teaching methods for meaningful learning to take place. du Plessis and Muzaffar (2010, quoted in Vavrus, et al., 2011) note that lack of PCK limits a lecturer's competence in demonstrating to students how the subject matter can be presented through participatory methods.

Child and Heavens (2003, quoted in Alemu, 2010) reported that researchers found that lecturers could not link the theory they taught with practice. This, therefore, creates a gap between the theory and practice. Alemu (2010) ascribes the lack of modelling of LCP by the lecturers to their inadequate training in the use of active learning methods. He contends that, "University lecturers must get the required training on how to implement instructional methodologies in general and the active learning approach in Mathematics education in particular" (p. 97).

One common factor and probably what we can learn from the above claims is that the teacher-training programme should be revamped so that it balances between subject content knowledge and pedagogical content knowledge offered to teachers under training.

5.5.2 Lack of professional support

The teachers involved in this study registered the issue of lack of school-based professional support as another hindrance to implementing LCP in their teaching. This professional support should be in the form of moral support from other teachers and school administration, and in the form of in-service training on the use of LCP. One of the teachers in this study suggested that for the approach to be effectively implemented in a school, the whole staff should embrace it. This, he said, was because it takes time for the learners to get used to it. If that is not the case, the teachers teaching in the higher Grades find it difficult to implement LCP since the learners would take time to adapt to it.

Alemu (2010, p. 97) agrees with this assertion as he writes, "in addition to this, they should provide the necessary training and continuous professional support and encouragement to teachers who are implementing the approach". On the other hand, Vavrus, et al., (2011) also notes that support for implementation of LCP should come "from the school head, fellow teachers, or both." (p.79). These authors note that some head teachers have strict beliefs on what constitutes classroom discipline. Hence, class noise due to learners who are involved in group discussions may not be welcome. The teacher may be seen to be failing to 'control' his/her class.

Without support from fellow teachers, a teacher who may be trying to implement LCP may be frustrated by learners' attitudes towards the teaching approach. Vavrus, et al., (2011, p. 80) noted that "teachers and school heads in secondary schools in sub-Saharan Africa report feeling frustrated by the problem of student discipline, and LCP may, in fact, compound this problem unless teachers prepare students for a different classroom dynamic".

There is also lack of in-service training on LCP for the Mathematics teachers in Swaziland. Most of the teachers interviewed in this study responded negatively when asked if

they had received any in-service training on LCP. These teachers requested that in-service workshops should be organised for them so that they get support from facilitators and from fellow teachers on how to overcome some of the challenges they face in implementing LCP. One of them said “it is not enough to only get information from the pre-service training; I think it is important to organise workshops so that we learn more, because as time moves on, there are changes that take place. So we need to be updated about these changes, especially the learner-centred approach”.

The reality on the ground therefore is that teachers have challenges in implementing LCP in their teaching. Therefore, there is absolute need to further train teachers on LCP so that they gain confidence in the use of the approach.

5.5.3 Overcrowding in classrooms

Overcrowding in the classrooms is another issue that was raised by the teachers which led them to fail to use LCP in their teaching. This challenge is mainly experienced in schools that are in the urban area, where classes range from 50 to 90 learners in a class. One of the teachers commented as follows: “the challenge is the numbers of pupils in the classes, the children in the classes are many”. When there is overcrowding in the classroom, it becomes difficult to rearrange the desks for the learners to engage in group work (Asale, 2014). The problem of overcrowding in the classrooms was a result of the introduction of free primary education in Swaziland in 2010. When free primary education was introduced in the country, there were not enough teachers and classrooms to accommodate the new learners.

Overcrowding in classrooms makes it difficult for teachers to maintain order, while the learners work together on a given task. One teacher said, “also you cannot control the learners, once they start discussing others just make noise instead of doing the job. They get an

opportunity to talk with their friends, that's what I have observed since I started teaching". To avoid the challenge of maintaining order in an overcrowded classroom, the teachers resort to using expository methods of teaching, where the learners sit quietly and listen to the teacher. The large number of learners in the classrooms also work against the use of "formative, competency-based assessments advocated by LCP because the sheer number of students makes it difficult for teachers to administer multiple, multi-modal assessments to large number of students" (Vavrus, et al., 2011, p. 81).

Epri's (2016) study in New Guinea found that overcrowding in classes has a negative effect on students' learning. Teachers cannot pay attention to individual learners in an overcrowded class, especially of slow learners. According to Epri (2016) a big class size also compromises the use of learner-centred teaching.

5.5.4 Use of English as a language of instruction

Another hindrance to the implementation of LCP in the schools in Nhlangano is the use of English as the language of instruction in the schools. The Swaziland government policy on the teaching of primary school learners is that English should be used from Grade 4 as the main language of instruction. Most of the teachers interviewed raised a concern that the learners would not understand in class due to the language barrier. One of them said, "in the primary school we have a problem, our students tend not to understand English language, so as teachers it gives us a problem". Another one echoed him, "my school is in an urban area but generally even those that are in town you find that the English language is still a problem".

The importance of using English language in teaching Mathematics cannot be denied since English is one language that is used in international communication. Developments in

Mathematics and technology are mostly communicated in English. So for one to communicate in Mathematics globally, he/she must do so in English.

Schoenfeld (1992) has shown the importance of problem solving for the learning of Mathematics with understanding. Varughese (2009) ascertains that proficiency in the language of instruction is important for a learner to be successful in problem solving. This is because problem solving is dependent on metacognition and comprehension of the problem to be solved. Cummins (2000, quoted in Varughese, 2009) says that proficiency in the English language is in two forms; namely conversational and academic proficiency. Conversational proficiency refers to the ability to communicate in everyday language whilst academic proficiency is the ability to use technical academic language, including reading and writing.

According to Cummins (2000), proficiency/fluency in conversational language does not necessarily mean proficiency in academic language. This is due to the fact that it takes longer to develop academic language proficiency than to develop conversational proficiency. It takes about two years to acquire conversational fluency of a second language and about five to seven years to acquire academic language fluency (Cummins, 1981, quoted in Virginia department of Education, 2004). Most learners who are in the primary school have not yet gained proficiency in academic English, which is the language of instruction in Swaziland. This poses the challenge for learners to master Mathematics content, while they are still trying to master English language. Varughese (2009) contends that to be successful in Mathematics problem solving, a learner needs to develop academic language proficiency.

Besides proficiency in academic language, learners also encounter difficulties in understanding the language of Mathematics. The Virginia Department of Education (2004) lists three components of mathematical knowledge; namely linguistic knowledge, conceptual

knowledge and procedural knowledge. Linguistic knowledge entails an understanding of the language of Mathematics. “Mathematics has its own specialised language, grammatical patterns, and rules. While limited English proficient students are learning English, they must also learn the unique meanings that some English words have in a mathematical context” (Virginia Department of Education, 2004, p. 12).

Learning the language of Mathematics involves learning the special vocabulary of Mathematics, e.g., divisor, quotient, and hypotenuse. Learners need to learn meanings of words as used in Mathematics, which have a different meaning than in ordinary English language, e.g., odd, mean, net.

They must also conceptualise that prepositions such as; by, with, from, etc., may be used to represent mathematical operations in word problems (Virginia Department of Education, 2004). Learning all these aspects of the language of Mathematics may create confusion to learners, who are learning Mathematics in a second language. Leyendeker, et al., (2008, quoted in Vavrus, et al., 2011) agrees with this assertion that the medium of instruction could be a practical challenge, especially for the implementation of LCP. Leyendeker, et al., says LCP relies greatly on linguistic skills in the language of instruction to express complex ideas. “Thus, LCP places significantly higher linguistic demands on teachers and students than teacher-centred approaches” (Vavrus, et al., 2011, p. 81). Thus, the difficulty in understanding the language of instruction by the learners forces teachers to use teacher-centred approaches, which do not put too much linguistic demand on the language of instruction.

5.6 THE TEACHERS' PEDAGOGICAL APPROACHES IN THE TEACHING OF MATHEMATICS

The constructivist approach to learning is described as a process where, through an active involvement in designed tasks, learners re-discover knowledge. This is contrary to what Freire calls banking education, where learners are filled with information while they passively receive, and are supposed to memorise this information and 'file' it for easier recall during assessment exercises (Freire, 2005).

In contrast to the traditional expository methods of teaching, learner-centred pedagogy puts the learner at the centre stage. The teacher acts as a facilitator by designing appropriate tasks and guiding the learner to construct his own knowledge by working through these tasks. The teacher should provide a conducive classroom environment for meaningful learning. This involves an arrangement that allows cooperative learning and a class where all learners are free to express their views without fear or prejudice. Learning through LCP cultivates problem solving skills and develops learners' democratic skills (Jotia, 2011).

This study established that most teachers use the demonstration and discussion methods in their teaching. In the demonstration method, the teacher shows learners how a task is done. The learners are then requested to do the task as the teacher showed them. For an example in Mathematics, the teacher first demonstrates how to work out a problem. The learners are then given similar problems to work out using the teacher's method. The teachers also said they use the discussion (group work) method. However, in the questionnaire, more than 80% of the teachers said they sometimes did all the talking in class. This shows that they do not fully use LCP in their teaching. Pedagogically the constructivists argue that learners construct knowledge when they are involved in active learning methods instead of listening to the teacher (Alemu,

2010). According to Alemu (2010, p. 15), a case is made that learners in a learner-centred class "are involved in more than just listening and taking notes; they participate in a variety of class activities, and often interact with one another (in discussing, reading, presenting and sharing their writing)".

From these results, it can be said that the extent to which the teachers use LCP in their teaching is limited. The limited use of LCP compromises the quality of learning Mathematics in the schools involved in this research. Although the teachers showed that they know a lot about LCP during the interview, the questionnaire results show that implementation of the approach is very low. The low level of implementation of LCP in their teaching could be due to the reasons outlined in section 5.5 above.

5.7 RECOMMENDATIONS

This study has established that the use of LCP in the teaching of Mathematics is at a low level. It has however been found out that the teachers' understanding of LCP is satisfactory. The following recommendations are suggested to enhance the implementation of LCP in the teaching of Mathematics in primary school in Swaziland.

1. The teacher training colleges and universities should provide professional development for teacher educators on learner-centred pedagogy. For an overall implementation of LCP at the teacher training institutions this training should be afforded to all tutors and not only specific subject areas. The tutors should then model to the student teachers how to use LCP in teaching, to close the gap between theory and practice. The number of pupils in a class in the schools should also be reasonable for possible teaching through LCP. According to The World Bank (2006), the recommended reasonable number of pupils in

a class in Swaziland is 45 learners, and the number should be strictly adhered to, if at all positive results are to show.

2. There should be in-service workshops for the practicing teachers on how to use LCP. Most of the teachers raised a number of hindrances in their use of LCP. Through in-service training, these hindrances would be discussed, and the teachers empowered with skills on the use of LCP.
3. The pre-service curriculum should be reviewed to inculcate training on the use of active learning methods. The ministry of education has passed policy that favour the use of LCP in schools, but the training institutions' curricula has not been revised to cater for the training of teachers on learner-centred teaching methods. Such a review should integrate pedagogy and content knowledge. This will enable teachers to understand how to present their subject content to learners for meaningful understanding.
4. The general recommendation in terms of policy is that the national assessments given to learners at Grade 7, Form 3 and Form 5 are aligned with the learner-centred approach that has been recommended to be used in the schools.

5.8 IMPLICATIONS FOR FURTHER RESEARCH

This study concentrated on the use of LCP in the teaching of Mathematics in primary school in Nhlangano, Swaziland. There is need to pursue further research in this area, which should involve teachers in other areas of Swaziland, and also in other subjects to confirm the findings of this study. This will reinforce this contribution towards the development of rigorous research data, based on the use of LCP.

5.9 CHAPTER SUMMARY

This chapter presented a discussion of the results, conclusions and recommendations were suggested. The purpose of this study was to investigate the teachers' understanding of the use of Pragmatic LCP approach and to find out their classroom practice in the teaching of Mathematics. The key research questions that drove the study were:

- What are teachers' conceptions of the pragmatic learner-centred pedagogical approach to the teaching of Mathematics?
- What are the teachers' experiences in the use of the learner-centred approach?
- What are the teachers' pedagogical approaches to their teaching of Mathematics?

In this chapter, the researcher generally covered the discussion of the key research findings of this study, which summarily included that although teachers were oriented on LCP at College level; the training was inadequate for them to implement the approach. Therefore they do not use this approach fully in their teaching.

The study found that even though the Swaziland government policy states that teaching should be done through learner-centred methods, the predominant teaching approach in the schools is teacher-centred. This state of affairs is caused by a number of factors including, inadequate training of teachers on LCP, overcrowded classrooms, and lack of support for the teachers on the use of LCP methodology. It is believed that a review of the pre-service training curriculum, empowerment of lecturers on LCP and support through in-service training can enable the teachers to use LCP in their teaching.

Finally, this chapter ends by making recommendations for a review of pre-service curriculum to improve the quality of teacher training, hence improving the quality of education

in Swaziland, especially when noting that the performance of learners in Mathematics is not very impressive.

REFERENCES

Abrami, P.C. & Pillay, V. (2007). Teaching and Learning Strategies Questionnaire. Montreal: Center for the Study of Learning and Performance.

Albert, L.R. (2000). Outside-In --- Inside-Out: Seventh –Grade students' mathematical thought processes. *Educational Studies in Mathematics,* 41, 109-141.

Alemu, B.M. (2010). *Active learning approaches in Mathematics education at universities in Oromia, Ethiopia.* A dissertation submitted in accordance with the requirements for the degree of Doctor of Education at the University of South Africa.

Anderson & Krathwohl (2001). The Application of Critical Thinking in Teaching English Reading.*Theory and Practice in Language Studies,* 1(2), 136-141.

Anthony, G. (1996). Active learning in a constructivist framework. *Educational Studies in Mathematics,* 31(4), 349-369.

Asale, T. 2014. *Assessing the impact of large class size on the implementation of student centred learning approach in English classroom; the case of Filtu preparatory School*. A Thesis submitted to the College of Social Sciences and Humanities School of Foreign Language studies, School of Graduate Studies Haramaya University.

Biggs, J. (1996). Enhancing Teaching through constructive alignment. *Higher Education* 32, 347-364.

Bagley,T. & Gallenberger,C. (1992). Assessing Students' Disposition: Using Journals to improve Students' performance. *Mathematics Teacher,* 85(8), 660-663.

Baker, E., McGaw, B. & Peterson, P. (2007). Constructivism and learning. International Encyclopaedia of Education 3th Edition, Oxford, England: Retrieved November, 22, 2015 from http://folk.uio.no/sveinsj/Constructivism_and_learning_Sjoberg.pdf.

Barman, C. & Allard, D. (1993). The Learning Cycle and College Science Teaching. *A paper presented at the 15th Annual International Conference of the National Institute for Staff and Organizational Development on Teaching Excellence and Conference of Administrators.*

Brikci, N & Green, J. (2007). A Guide to using Qualitative Research Methodology. London: Michael Quinn Patton & Michael Cochran.

Cangelosi, J.S. (1996). *Teaching Mathematics in Secondary and Middle School: an Interactive approach*. 2nd edition.New Jersey: Merrill.

Clarke, V. and Braun, V. (2013). Teaching thematic analysis: Overcoming challenges and developing strategies for effective learning. *The Psychologist*, 26 (2), 120-123.

Cohen L. ; Manion L. & Morrison, K. (2007). Research Methods in Education. 6th Edition. New York: Routledge

Cooney, T & Hirsh, C. (1990). *Teaching and Learning Mathematics in the 1990s*. NCTM: Reston: National Council of Teachers of Mathematics

Cornelius – White, J.H.D. (2007). Teachers who care are more effective: A meta-analysis of learner-centred relationship. *Review of Educational Research,* 77(1), 113-143.

Cresswell, J.W. (2009). Research Design – Qualitative, Quantitative and Mixed Methods Approaches. 3rd Edition. Singapore: Sage

Dlamini, M. (1972). *The Philosophy, Policies and objectives of the Imbokodvo National Movement.* Mbabane: Swaziland Printing and Publishing Company.

De Boer, H., Donker-Bergstra A., & Kostons, D. (2012). Effective Strategies for Self-regulated Learning: A Meta-Analysis.

Dictionary.com. An online dictionary retrieved on 18 January 2016 from http://www.dictionary.com/browse/education.

Effeney, G., Carroll A., & Bahr, N. (2013). Self-regulated learning: Key strategies and their sources in a sample of adolescent males. *Australian Journal of Educational & Developmental Psychology,* 13, 58-74.

Epri, M. L. (2016). A case study on the impact of large classes on student learning. *Divine World University Research Journal*, 24, 95-109.

Fasse, B., & Kolodner, J.L. (2000). Evaluating Classroom Practices Using Qualitative Research Methods: Defining and Refining the Process. In B. Fishman & S. O'Connor-Divelbiss (Eds.), *Fourth International Conference of the Learning Sciences* (pp.193-198). Mahwah: Erlbaum.

Fereday, J. & Muir-Cochrame, E. (2006). Demonstrating rigor using thematic analysis : A hybrid approach of inductive and deductive coding and theme development. *International Journal of qualitative methods,* 5(1), 80-92.

Freire, P. (2005). *Pedagogy of the oppressed*. 30th edition. New York: Continuum.

Freire, P. (1970). Cultural Action for freedom. Cambridge: Harvard Educational Review.

Gagnon, G.W.Jr, & Collay Michelle (2006). Constructivist Learning Design. Retrieved on 07.06.2016from www.wnlsd.ca/rocketry/resources/Gagnon_Collay_ConstructivistLearningDesign.pdf

Gerofsky, S.G. (1999). *The Word Problem as genre in Mathematics education*. A thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Philosophy at the Simon Fraser University. Canada.

Glasersfeld, E. (1989).*Constructivism in Education*. In: T. Husen & T. N. Postlethwaite, (eds.) (1989). The International Encyclopedia of Education, Supplement Vol.1. New York: Pergamon Press, p. 162-163.

Golafshani. (2003). Understanding Reliability and Validity in Qualitative Research. *The Qualitative Report,* 8(4), 597-607.

Gooding, S. (2009). Children's Difficulties with Mathematical Word Problems. In *Proceedings of the British Society for Research into Learning Mathematics* 29(3), 31-36.

Gosling, D. (2003). Encouraging student motivation. In: Fry, H.; Ketteridge, S. & Marshall, S. (eds), A *Handbook for Teaching and Learning in Higher Education,* 2nd Edition, pp. 162-181. London: Routledge Falmer.

Griffin, C. & Phoenix, A. (1994). The relationship between qualitative and quantitative research : Lessons from feminist psychology. *Journal of community and applied social psychology,* 4(4), 287-298.

Harber, C. (2002). Educational, democracy and poverty reduction in Africa. *Comparative Education*, 38(3), 267-276.

Jones, L. (2007). *The Student-Centered Classroom*. New York: Cambridge University Press.

Jotia, A. (2010). Democratizing Education for the Enhancement of Education for Sustainable Development: A challenge in Botswana. *International Journal of Scientific Research in Education* 3(2), 113-120.

Jotia, A.L. (2011). Use of Instructional Materials in Social Studies : Impact on Students' Performance in Primary school Leaving Examinations in Botswana. *European Journal of Educational Studies* 3(1), 111-122.

Jotia, A.L. & Boikhutso, K. (2016). Two Worlds apart in Botswana's education System: Lessons from the 2010 Examinations Crisis. *International Perspectives on Education and Society.* 28, 251-278.

Jotia, A.L.& Sithole, B.M.(2016). Pragmatizing democratic education in Botswana through business education: Countering the scourge of the diploma disease. *Curriculum & Teaching Studies.*Cogent Education (2016), 3: 1189482.

Khumalo, T. 2013. Effective Delivery of Public Education Services. *A review by AfriMAP and the Open Society Initiative for Southern Africa.* Johannesburg: Open Society Foundations.

Knortz, G.S. (2009). *A case study: assessing the validity and reliability of the multidimensional Sportspersonship orientation scale among college athletes*. (Masters thesis, University of Vermont).

Krefting, L. (1990). Rigor in Qualitative Research: The Assessment of Trustworthiness. *The American Journal of Occupational Therapy*, 45(3), 214-222.

Magagula, C. 1990. *Implementing Educational Policies in Swaziland*. World Bank Discussion Papers – Africa Technical Departmental series. Washington D.C.: The World Bank.

McCombs, B. (2001). What do we know about learners and learning? The learner-centered framework: bringing the educational system into balance. *Educational Horizons*, 79 (4), 182-193.

McCombs, B. L. & Whistler, J. S. (1997). *The Learner-Centered Classroom and School. Strategies for Increasing Student Motivation and Achievement.* Sam Francisco: Jossey Bass Publishers.

Meece, J.L. (2003). Applying learner-centred principles to middle school education. *Theory into Practice*, 42(2), 109-116.

Mehdinezhad, V. (2011). Teachers' instructional beliefs about student-centered pedagogy. *International Journal on New Trends in Education and Their Implications*. 2(2), 49-64.

Merriam, S.B. (1998). Qualitative Research and case study applications in education. Revised and expanded from "Case Study Research in Education". San Francisco: Jossey-Bass Publications.

Msonde, C.E. (2011). Enhancing teacher's competencies on learner-centred approaches through learning study in Tanzanian Schools. A Phd thesis submitted to the University of Hong Kong.

Ministry of Education and Training, (2012). *Primary Certificate Mathematics Teaching Syllabus*. Mbabane: Kingdom of Swaziland.

Mtitu, E.A. (2014). Learner-centred teaching in Tanzania: Geography teachers' perceptions and experiences. *A thesis submitted to Victoria University of Wellington in fulfilment of the requirements for the degree of Doctor of Philosophy*. Victoria University of Wellington.

Musonda, A. (2009). *Reviewing the learner-centred approach in the teaching of Mathematics at Nkrumah and Copperbelt Secondary Teachers Colleges*. (Masters thesis, University of Zambia). Lusaka. University of Zambia.

Mwamwenda, T.S. 1989. *EDUCATIONAL PSYCHOLOGY – An African Perspective*. Durban: Butterworth.

Ndaruhutse (2008). *Grade Repetition in Primary schools in Sub-Saharan Africa: an evidence base for change. CfBT Education Trust*. Retrieved on 07.06.2015 from www.cfbt.com.

Nielsen, L. (2008). *The innovative Educator*. Retrieved from http://theinnovativeeducator.blogspot.com/2008/04/ten-21st-century-education-quotes-i.html.

Ntshangase, W. (2011). *The Swaziland Education and Training Sector Policy.* Ministry of Education and Training. Mbabane: Swaziland.

Olaussen, B.S. & Braten, I. (1999). Students' use of Strategies for Self-regulated Learning: cross-cultural perspectives. *Scandinavian Journal of Educational Research* 43(4):

Palincsar, A. S. (1998). Social Constructivist Perspectives on Teaching and Learning. *Educational Studies* 49, 345-375.

Patton, M. (1990). Qualitative evaluation and research methods. Beverly Hills, CA: Sage.

Robinson, C. (ed.). (2012). Student- Centred Approaches in Mathematics. *Case Studies of Innovative Practice*. Birmingham: Loughborough University. Accessed on 24.11.2016 from http://www.mathcentre.ac.uk/resources/uploaded/Studentcentered.pdf

Rop Chepkemoi; Osman & Kirui. (2013). Towards Learner-centred Pedagogies by Teacher Educators in Kenya: A study of Kericho Teachers' Training College. *International Journal of Asian Social Science,* 3(1), 255-265.

Richardson, V. (2003). Constructivist Pedagogy. *Teachers College Record* 105 (9), 1623-1640.

Schiller, S.Z. (2009). Practicing learner-centred teaching : Pedagogical design and assessment of a second life project. *Journal of Information Systems Education,* 20 (3), 369.

Schoenfeld, A. H. (1992). Learning to think mathematically: Problem solving, metacognition, and sense-making in Mathematics. In D. A. Grouws (Ed.), Handbook for Research on Mathematics Teaching and Learning (pp. 334 - 370). New York: MacMillan.

Schutt, R. K. (2011). *Investigating the social world: The process and practice of research*. Pine Forge Press.

Sharma, S. (2015). Language barriers in Mathematics education: Some findings from Fiji. *7th ICMI-East Asia Regional Conference on Mathematics Education*, Cebu City, p. 543-549.

Shaw, J.M (2002). Manipulatives Enhance the learning of Mathematics. *Houghton Mifflin Mathematics.* Last accessed on 24.11.2016 from http://www.eduplace.com/state/author/shaw.pdf

Shield, M. & Galbraith, P. (1998). The analysis of student expository writing in Mathematics. *Educational Studies in Mathematics*, 36 (1), 29-52.

Siraj-Blatchford, I., Sylva, K., Muttock, S., Gilden, R. & Bell, D. (2002). Researching Effective Pedagogy in the Early Years. Retrieved 08 January 2016 from www.ioe.ac.uk/REPEY_research_brief.pdf

Steiner Khansi, G.& Simelane I. (2010). *Teachers: Recruitment, Development and Retention in Swaziland*. The UNICEF ESARO Study on Teachers UNICEF ESARO & UNICEF SWAZILAND. Mbabane: Swaziland.

Stronkhorst, R. J. (2001). *Improving science education in Swaziland: The role of inservice education*. Universiteit Twente. Accessed on 24.10.2015 from http://doc.utwente.nl/36334/1/thesis_Stronkhorst.pdf.

Tabulawa, R. (2013). Teaching and Learning in Context. *Why Pedagogical Reforms Fail in Sub-Saharan Africa*. Dakar: Codesria.

Taber, K.S. (2011). Constructivism as educational theory: Contingency in learning, and optimally guided instruction. In Hassaskhab, J. (ed) (2011). *Educational theory*. pp 39-61. New York: Nova Science Publishers.

The World Bank (2006). Swaziland Achieving Education for All; Challenges and Policy Directions. Africa Region Human Development working paper series 109.

UNESCO – IBE 2010/11. World Data on Education 7th edition. Retrieved on 15.03.2015 from http://www.ibe.unesco.org.

Van de Walle, J.A. (2006). *Elementary & Middle school Mathematics. Teaching student-centred Mathematics*. 6th Edition. Boston: Pearson.

Varughese, N. A. (2009). *Language Difficulties in Mathematics Courses for Students from Non-English Speaking Backgrounds in the Transition from Secondary to Tertiary Education*. A thesis submitted to RMIT University in fulfillment of the requirement for the degree of doctor of philosophy by research in the school of education RMIT University. Melbourne.

Vavrus, F.; Thomas, M. & Bartlett, L. (2011). *Ensuring quality by attending to inquiry: Learner-centered pedagogy in sub-Saharan Africa*. Addis Ababa: UNESCO-IICBA.

Virginia Department of Education. (2004). *Mathematics: Strategies for Teaching Limited English Proficient Students.* A Supplemental Resource to the K-12 Mathematics Standards of Learning Enhanced Scope and Sequence. Richmond: accessed on 24.11.2015 from http://www.doe.virginia.gov/instruction/esl/resources/strategies_teach_math.pdf

Volberg, M. (2008). *The Democratic Conception of Education and the Problem of Civic Education*. A Bachelor's thesis. Institute of Philosophy and Semiotics, University of Tartu.

Winstead, L. (2004). Increasing academic motivation and cognition in reading, writing, and Mathematics : Meaning making strategies. *Educational Research Quarterly* 28(2), 30-50.

Woolfolk, A. (2011). *Educational Psychology:* Active Learning Edition. 11th Edition. Boston: Allyn & Bacon.

Yusef, W. (2014). *Pedagogy Out of Bounds: Untamed Variations of Democratic Education*. London: Routledge.

Zimmerman , B. J. (1989). A social cognitive view of self-regulated academic learning. *Journal of Educational Psychology* 81(3), 329-339.

Zumbrunn, S., Tadlock, J., & Roberts, E.D. (2011). Encouraging Self-Regulated Learning in the Classroom: A Review of the Literature. *Metropolitan Educational Research Consortium (MERC), Virginia Commonwealth University.*

APPENDICES

Appendix 1
ETHICAL CLEARANCE

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

12 January 2016

Mr Simon Ntuntu Dlamini 214583588
School of Education
Edgewood Campus

Dear Mr Dlamini

Protocol reference number: HSS/1364/015M
Project title: An examination of the use of pragmatic learner centred pedagogy in the teaching of Mathematics in primary schools in Nhlangano-Swaziland

Full Approval – Expedited Application

in response to your application received 29 September 2015, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol has been granted **FULL APPROVAL.**

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment /modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

.....
Dr Shenuka Singh (Chair)
Humanitities & Social Scinces Research Ethics Committee

/pm

Cc Supervisor: Prof AL Jotia
Cc Academic Leader Research: Professor P Morojele
Cc School Administrator: Ms T Khumalo

Appendix 2

REQUEST FOR CONSENT DOCUMENT

The Headteacher
Evelyn Baring Primary school
P.O.Box 21
NHLANGANO.

Dear Madam,
Re: application for consent to involve your school in research

I hereby humbly ask for permission to involve Mathematics teachers in your school in a research study. I am a student of the University of KwaZulu Natal currently pursuing a Master of Education (MEd) degree with specialization in Mathematics education.

As part of the completion of this degree, I am carrying out a research on the classroom practice in the teaching of Mathematics entitled "AN EXAMINATION OF THE USE OF PRAGMATIC LEARNER CENTRED PEDAGOGY IN THE TEACHING OF MATHEMATICS IN PRIMARY SCHOOLS INNHLANGANO-SWAZILAND".

I therefore request input from teachers in your school to complete this study. Please note that the name of your school and the names of the teachers shall not appear anywhere in the research report.
I request to give questionnaires to the teachers, conduct interviews with them and make an analysis of their official books that they use for the teaching of Mathematics.

Sincerely yours,

Simon N. Dlamini Tel: 76222864
You may also contact my supervisor, Professor A.L Jotia at (-267)72125325 or by email at agreementjotia@yahoo.com

Appendix 3

College of humanities
University of KwaZulu-Natal,
Edgewood Campus,

Dear Participant,

INFORMED CONSENT LETTER

My name is Simon Dlamini. I am a MEdstudent studying at the University of KwaZulu-Natal, Edgewood campus, South Africa.

I am interested in learning about how Mathematics teachers are using the learner centred approach in their teaching. I am studying cases in primary school in the Nhlangano area. Your school is one of my case studies. To gather the information, I am interested in asking you some questions.

Please note that:

- Your confidentiality is guaranteed as your inputs will not be attributed to you in person, but reported only as a population member opinion.
- The interview may last for about 1 hour and may be split depending on your preference.
- Any information given by you cannot be used against you, and the collected data will be used for purposes of this research only.
- Data will be stored in secure storage and destroyed after 5 years.
- You have a choice to participate, not participate or stop participating in the research. You will not be penalised for taking such an action.
- This research is investigating the classroom practice in the teaching of Mathematics in the primary school. By being involved in the research, the researcher will request you to fill in a questionnaire to give us an accurate understanding of the approach you use in teaching of Mathematics in your class.
- Your involvement is purely for academic purposes only, and there are no financial benefits involved.
- If you are willing to be interviewed, please indicate (by ticking as applicable) whether or not you are willing to allow the interview to be recorded by the following equipment:

	Willing	Not willing
Audio equipment		
Photographic equipment		
Video equipment		

I can be contacted at

Tel: +26822077277

Cell: +26876222864

Email: mmelidlamini6@gmail.com

My supervisor is Professor A.L Jotia. Contact details: email:agreementjotia@yahoo.com Phone number: (-267)72125325

You may also contact the Research Office through:

P. Mohun

HSSREC Research Office,

Tel: 031 260 4557 E-mail: mohunp@ukzn.ac.za

Thank you for your contribution to this research.

DECLARATION

I…… (full names of participant) hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project.

I understand that I am at liberty to withdraw from the project at any time, should I so desire.

SIGNATURE OF PARTICIPANT DATE

…… ……

Appendix 4

QUESTIONNAIRE FOR MATHEMATICS TEACHERS

Personal Information

Gender: M…… F……

School ……

Years of teaching experience ……years

Highest Qualification obtained ……

Age(years) : 21 – 30 31 – 40 41 – 50 51 – 60

Section A

Please tick the most appropriate response when answering the questions.

A. Strongly Agree **B. Agree** **C. Undecided** **D. Disagree** **E. Strongly disagree**

	A	B	C	D	E
1. In your opinion can the performance of learners in Mathematics be affected by the teaching method which is used?					
2. Do your learners set their own process goals, i.e. determine what tasks are required to achieve their learning goals?					
3. The learners in my class identify strategies for solving problems					
4. The learners in my class engage in constructive discussion with their Peers					
6. Are learners in your class able to stay on task when given a problem to solve?					

	A	B	C	D	E
7. My learners can work independently without relying too much on the teacher					
8. Do learners in your class start playing immediately the teacher leaves them to work on their own?					
9. Do your learners work well when given a task individually in Mathematics?					
10. Do your learners work well when given a task in group work in Mathematics?					
11. Do your learners understand better when concepts have been explained by the teacher while they listen attentively?					

Section B

1. Do you do all the talking (explaining) while in class?

Always [ ] Sometimes [ ] Never [ ]

2. Do you encourage group work among your learners during your lessons?

Always [ ] Sometimes [ ] Never [ ]

3. Do you encourage your learners to use different methods to find answers?

Always [ ] Sometimes [ ] Never [ ]

4. Do you ask your learners to explain their methods of finding the answers, either verbally or in writing?

Always [ ] Sometimes [ ] Never [ ]

Thank you very much for taking the time to complete the questionnaire.

Appendix 5

INTERVIEW SCHEDULE FOR TEACHERS

Gender: M……F…….

School ……

Teaching Experience: ……years

Highest Qualification …….

Age : 21 – 30 31 – 40 41 – 50 51 – 60

1. What do you understand by the concept 'the learner centred approach' to teaching Mathematics?

2. Which method(s) of teaching do you usually use in your teaching of Mathematics? Please justify your choice.

3. Which teaching method(s) would you classify under the learner centred teaching approach? Please explain.

4. What is your view of the use of word problems that require problem solving in your assessment of learning? Please explain.

5. What is your take on the use of the learner centred approach to teaching Mathematics?

6. Did you receive any training on the use of the learner centred pedagogy to teaching?

   Yes [ ] No [ ]

7. Do you find your pre-service training of any influence in the choice of your teaching approach?

8. Which aspect of the learner centred approach do you feel teachers need in-service training on?

9. If there is one thing you would recommend be changed regarding the pedagogical approaches to the teaching of Mathematics, what would it be? Please elaborate.

Thank you, I appreciate your time.